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fauna & flora - 31

Transvaal Nature Conservation Division

FAUNA & FLORA

TRANSVAAL NATURE CONSERVATION DIVISION

NUMBER 31 DECEMBER 1977

CONTENTS

Wild orchids – colourful and interesting ii
Research on the sable antelope . . 5
Wild hunters in need of protection 6
Prawns from the river 8
Striped horses 10
Radiotracking – bats to elephants . . 13
Birds of prey in danger 15
Watching the lovable klipspringer . 19
Roodeplaat Dam Nature Reserve – a major outdoor recreational area . . 20

Cover photograph: Martial eagle
Photo: Lorna Stanton

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Wild orchids - colourful and interesting.

Fanie Venter
Botanical Research Institute, Pretoria

The orchid family boasts some of the most colourful and striking flowers of all plants. Few people realise that the orchids, comprising 15 000 species, form the largest plant family in the world.

Two to three thousand species occur in Africa, of which 470 are found in the Republic. The best-known orchid species in Africa is the Vanilla orchid. Vanilla flavour is produced from the fruit of the Malagasy and Tropical African species, *Vanilla planifolia*. Plantations of this species have been established in many tropical countries, although the Malagasy Republic produces 90 percent of the world crop at present.

Our best-known orchid is probably the Red Disa, also known as the Pride of Table Mountain, *Disa uniflora*.

Orchids can be placed into two distinct groups due to their habitat preferences, viz. epiphytic and terrestrial.

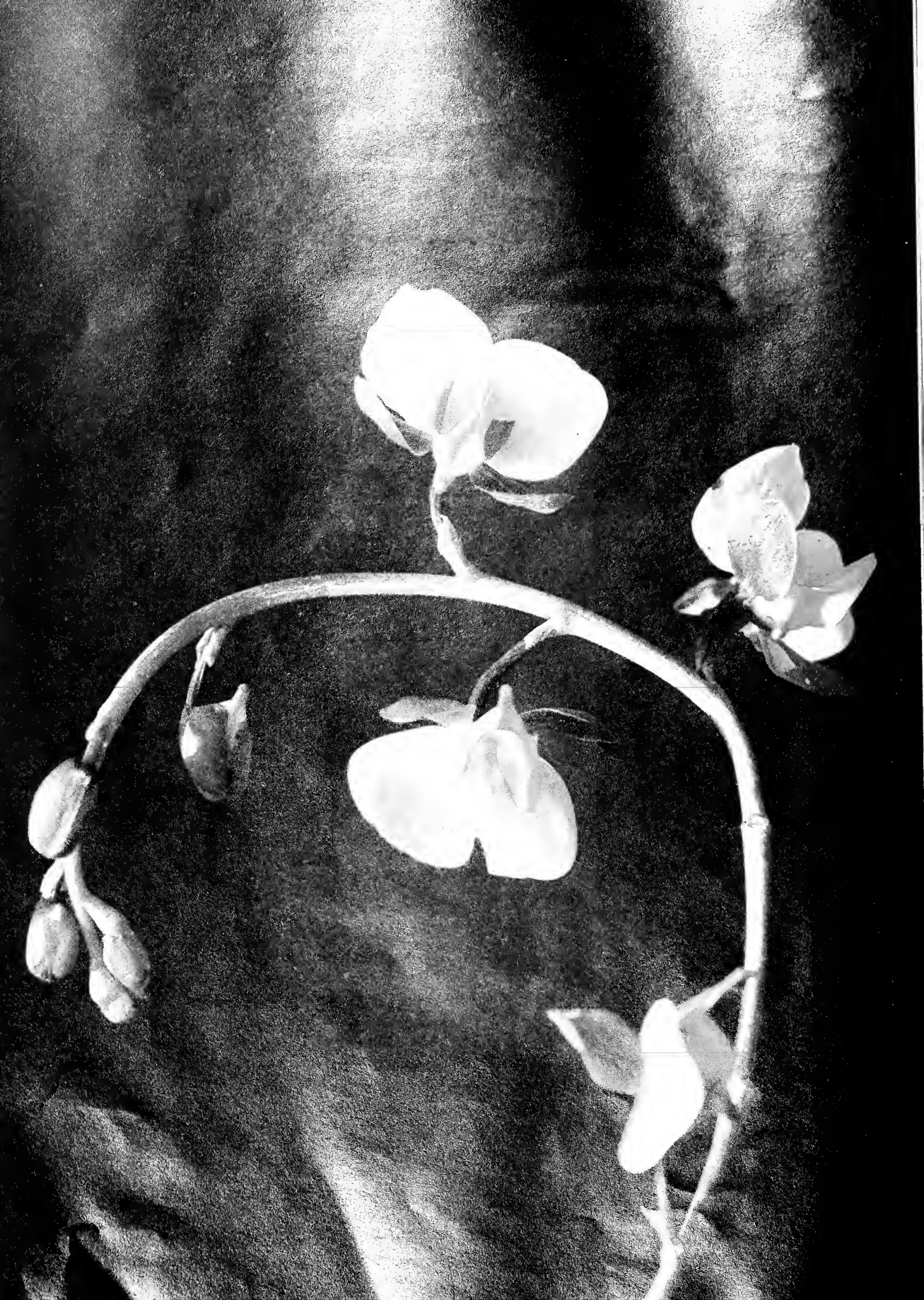
The epiphytic orchids grow mainly on trees and lianes. Some epiphytic orchids occur on rocks and are then known as epilithic orchids.

Epiphitic orchids use the trees solely for support and are therefore not parasitic. The roots extend into the air, such as those of the Leopard orchid (*Ansellia spp.*), and also penetrate between the mosses and ferns which also frequently grow on the branches, or merely cover the bark of the plants on which they grow. An example of this is the star tree orchid (*Mystacidium spp.*). The roots are covered by a thick sheath, the velamen, which is highly absorbent.

In Africa, as on other continents,

< *Disa uniflora*
Photo: G. van Ede

> *Schizodium bifidium*
Photo: G. van Ede



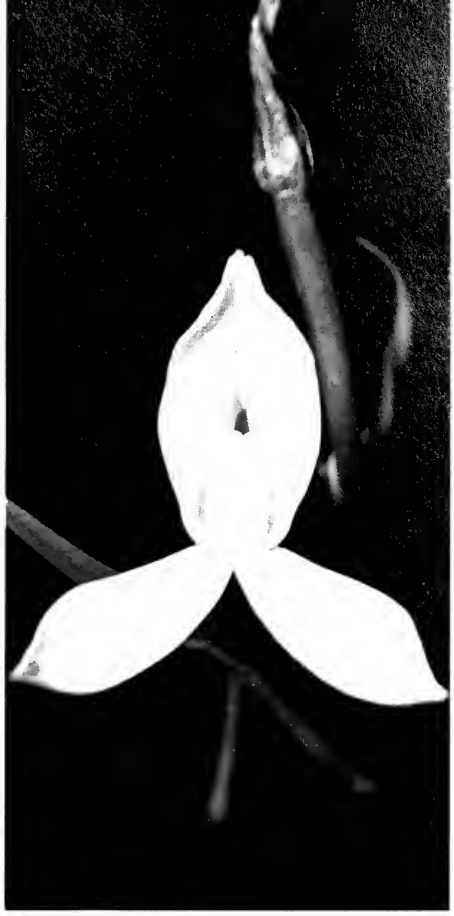
orchids are most common near the equator. Their numbers decline gradually towards the temperate zones, where they are rare. There are only 38 epiphytic species in the Republic, 30 of which occur in the Transvaal.

The 125 terrestrial orchid species of the Transvaal occur everywhere from the grassy plains of the Highveld to the summit of the Drakensberg mountains in the Eastern Transvaal. Practically all are adapted to the extended dormant period during the dry season, and have subterranean tubers or rhizomes for water storage. After the rains they grow to maturity within a short period.

Orchids produce the smallest and lightest seeds of all plants. A single flower can yield thousands of seeds. In the initial period of growth, the seed requires a specific nutrient-supplying fungus. The chances are therefore remote that a seed will come in contact with the fungus unless it lands in the proper growth medium. This is the reason why some orchids are so rare and often so difficult to grow.

All orchid species are protected in the Transvaal. Nobody may collect any of these orchid species from the veld, unless issued by the Administrator with a permit enabling them to do so.

The Fourth South African National Orchid Show and Conference will be held from 5-8 September 1979 in the City Hall of Pretoria



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Eulophia species
Photo: L. Stanton

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Brownlea monophylla
Photo: G. van Ede

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Eulophia clavicornis
Photo: G. van Ede

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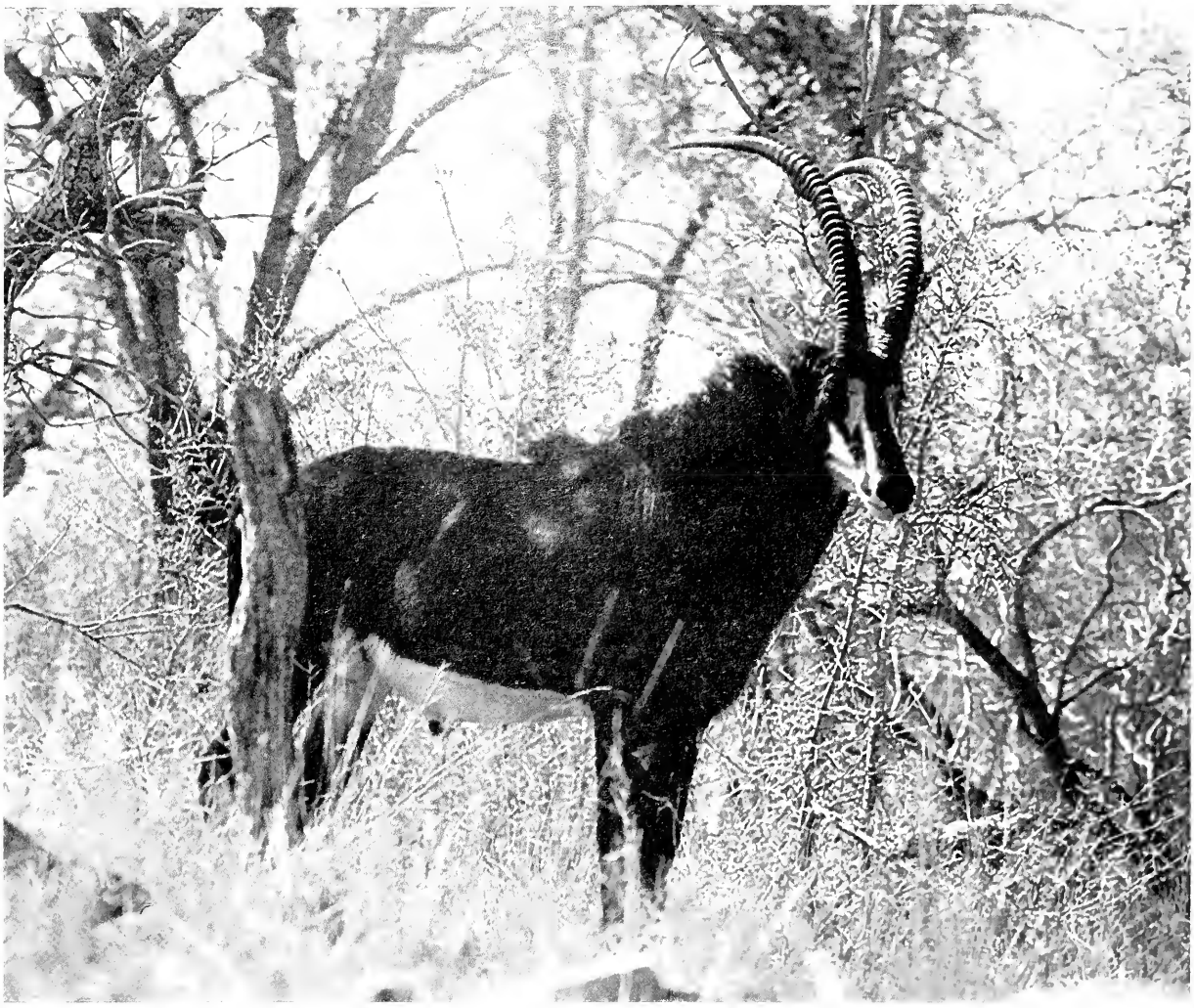
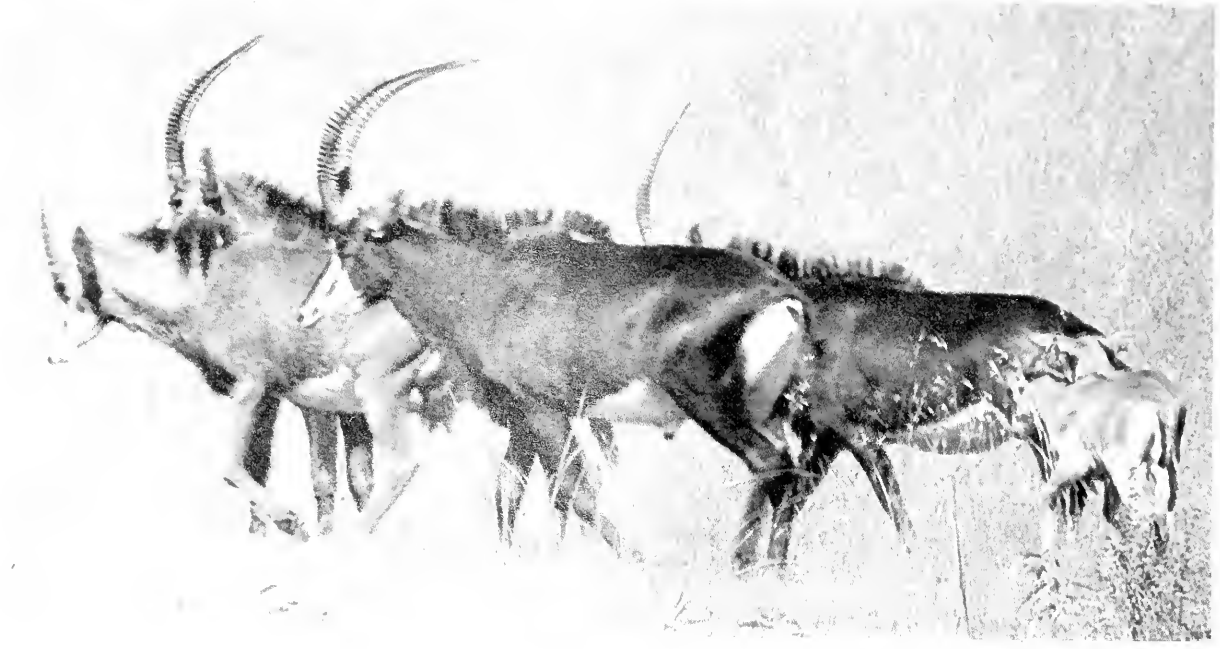
Ansellia gigantea var ailotica
Photo: G. van Ede





RESEARCH ON THE SABLE ANTELOPE

Dalene Delport
Information Officer
Transvaal Nature Conservation Division, Pretoria

The graceful sable antelope, *Hippotragus niger*, is not only one of the rarest, but also one of the most beautiful antelope of the Transvaal. Although sable antelope were fairly widely distributed throughout the Transvaal, the picture changed, however, as man expanded his agricultural activities and gradually limited the amount of suitable wildlife habitat available. Today the sable is largely restricted to nature reserves and other protected areas.

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The graceful sable antelope
Photo: D. Wolff

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A herd of sable antelope at the Percy Fyfe Nature Reserve
Photo: P. Barichievy

The Transvaal Nature Conservation Division contributed to the conservation of the sable, by relocated sable herds in the Rustenburg, Loskop Dam, Percy Fyfe and Hans Merensky Nature Reserves. Although these animals were protected in these reserves, their numbers remained low and many calves died at an age of about twelve weeks.

Dr. David Wilson, a past researcher of the Division of Nature Conservation, was selected to do a five-year research programme on sable and roan antelope. He had to investigate the causes of high infant mortality and, if possible, suggest management practices to overcome this problem.

The findings of his research proved that every adult female was reproducing, but that the survival rate of the calves was very poor. Dr. Wilson also found that this mortality was caused largely by protozoan parasites such as *Cytauxzoon* and *Babesia* species in the blood.

He also investigated the sable in Rhodesia to compare the situation, and found that they have a similar rate of infection by the same species of blood parasites as the sable in the Transvaal. The sable in Rhodesia were, however, very healthy. It was clear that the blood parasites were not the only reason for the high mortality rate of the Transvaal calves.

For this reason Dr. Wilson collected soil and grass, as well as blood and liver samples, which he analysed for various nutrients. These results were then compared to those of Rhodesia. It was found that the Transvaal animals were not obtaining sufficient nutrients from grazing because of the deficiency of nutrients in the soil.

Dr. Wilson recommended that the veld be experimentally fertilised to increase certain nutrients and that mineral licks be supplied. Sable could also be removed from areas where the soil is too poor and taken to reserves where the soil and habitat are better. It is trusted that the implementation of these recommendations will benefit this magnificent species and that calf mortalities will be dramatically reduced.

Wild hunters in need of protection

Dr. E. Young
Assistant Director
Research and Information
Transvaal Nature Conservation Division
Pretoria

The wild dog, *Lycaon pictus,* is probably the most threatened of all South African carnivores. The possibility of this unique species becoming extinct is even greater than that of the cheetah. They are scarce in the Kruger National Park and have become extinct in the Kalahari Gemsbok Park. Urgent measures are to be taken to ensure the survival of this vulnerable wild hunter.

They live and hunt in packs. In the Eastern Transvaal, one of the last strongholds of this unique species, impala probably constitutes the most important prey species of wild dogs. Animals as large as zebra and wildebeest may be hunted. Small mammals, such as rats and mice also form part of their varied diet and they are known to scavenge meat. Raiding packs may occasionally prey on livestock and scatter game herds on private farms. As a result wild dogs have been relentlessly persecuted and eradicated in most of their former range.

Wild dogs also play their role in the maintenance of the natural balance. It has often been observed that, when hunting large prey, the dogs primarily select sick animals. In so doing, prey animals serving as sources of sarcoptic mange and other diseases, are removed to give the healthy animals a better chance of survival. Obviously it is difficult, if not impossible, to assess the significance of predators in the natural control of disease in their prey species.

Wild dogs may breed throughout the year. In the Kruger National Park their birth peak in winter coincides with the time of year when prey concentrates along and around permanent waters.

After a gestation period of about two months, a litter of up to 10, or exceptionally even 15 pups are born. The very young pups are blind and helpless and are usually sheltered in breeding dens in caves or aardvark holes. When disturbed at the breeding site, the mother may pick her pups up, one by one and carry them to safety. She suckles her young until they are about five weeks old.

Most pack members share in the care of the pups which are fed on regurgitated, semi-digested meat. The adults are generally very protective and loving towards the smaller pups. When the latter arrive at a kill, they are often permitted by the older dogs to monopolize the carcass. The adults frequently form a circle around the pups to protect them and their food from approaching hyaenas and jackals.

In spite of the high reproductive success, few pups ever reach maturity. Cannibalism and predation on young dogs, and especially disease, seem to play a major role in the decimation of the species.

The pups are occasionally not guarded when the adults hunt and are then very vulnerable to predation by lions, leopards and hyaenas. Wild dog puppies are sometimes killed and devoured by vicious individuals in their own pride. When disturbed captive females even kill their own offspring in their attempts to protect them.

As part of an envisaged wild dog breeding programme the Motswari Wildlife Foundation is planning and erecting superb breeding and rearing facilities in prime wild dog habitat near the Motswari Game Lodge in the Eastern Transvaal. Research on the breeding and feeding habits of wild dogs, as well as on diseases and disease control, will all form part of this important project, to be guided and supported by the Transvaal Nature Conservation Division.

It is known that rickets may weaken wild dog pups to such an extent that they become unable to keep up with the rest of the pack. Such weaklings may fall prey to other predators or die from starvation. Wild dogs are also highly susceptible to canine distemper. Many animals are known to have died from this highly fatal viral disease and it seems to have had an extremely detrimental effect on certain packs elsewhere in Africa. In the Kruger National Park a rickettsial disease, known as rickettsiosis or ehrlichiasis, has caused very serious mortality amongst wild dogs in the southern district of the park. Effective ways of vaccination and treatment which may be utilised to protect captive and free-roaming animals are to be investigated.

Wild dogs are nomadic and wander over extensive ranges. The same pack may occupy a home range of over 700 sq km. When they occasionally leave their relatively protected hunting grounds in national parks and venture onto private land, entire packs are sometimes exterminated. Special attempts should be made to capture problem animals on private land and to release them subsequent to vaccination and appropriate prophylactic treatment, in safer areas such as the Kruger and Kalahari Gemsbok National Parks. The National Parks Board is already supporting this important rescue operation and it is trusted that private land owners, with wild dogs on their farms, in co-operation with the responsible conservation organizations, will act in time to prevent the extermination of wild dogs in Africa.

Photo: E. Young
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Wild dogs in their natural surroundings
Photo: E. Young
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Facilities for the breeding and rearing of wild dogs in captivity are being erected in the Motswari Game Lodge in the Eastern Transvaal
Photo: E. Young
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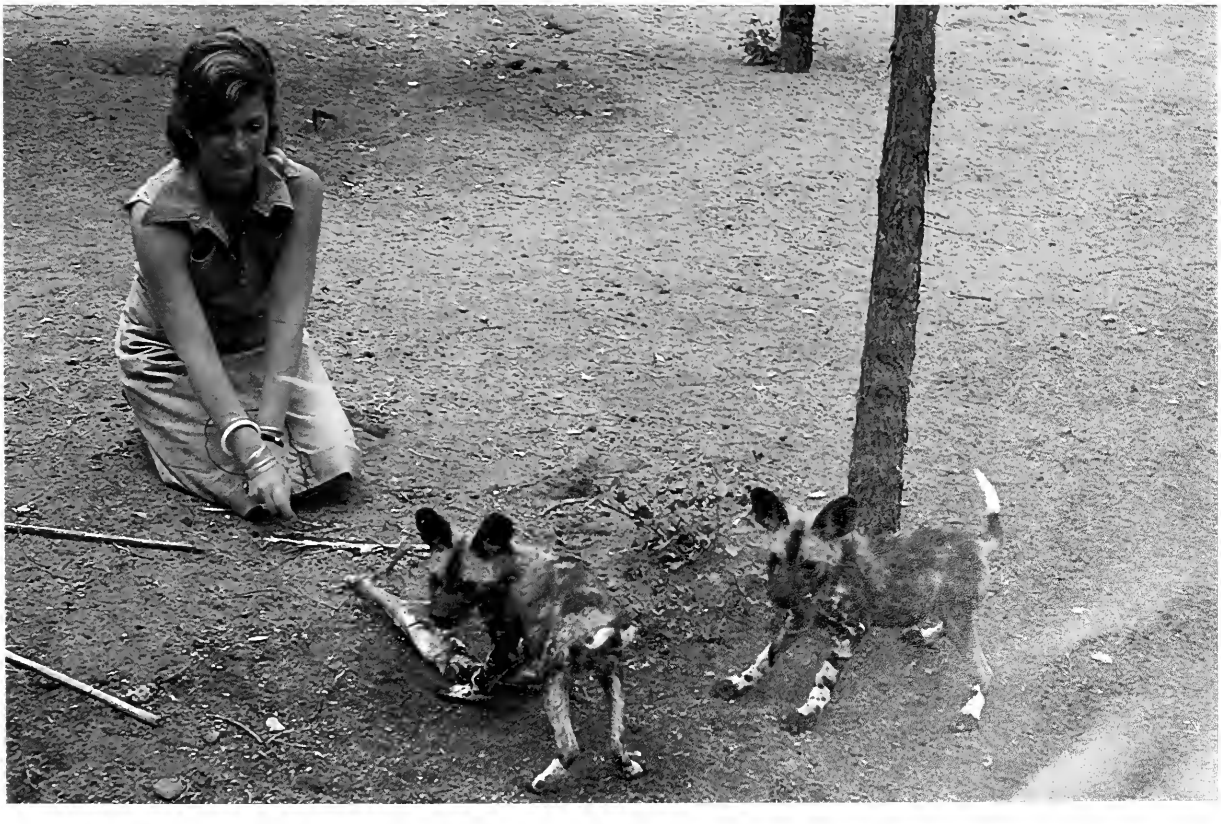

PRAWNS FROM THE RIVER

Nico P. van Loggerenberg
Professional Officer
Transvaal Nature Conservation Division, Lydenburg

Prawns belong to the class Crustacea, which also includes crayfish, crabs and shrimps. Fresh-water prawns of the genus *Macrobrachium* include several large edible species and have a tropical distribution in the rivers draining into the Atlantic Ocean. These prawns grow rapidly and can attain a body mass of up to 200 grams. The males are larger and heavier than the females.

Although the fresh-water prawn has long been a much sought-after dish in the Far East, the prawns which are served in local restaurants come, as we know, from the sea. The Malayan fresh-water prawn, *M. rosenbergii,* is best known since it has been cultured for some time in several tropical countries. Since 1965 it has been distributed to certain Latin American states and other countries, including India, Israel, Japan and even Great Britain.

The prawn trade of the Western countries, nevertheless remained the responsibility of the sea fisheries industries only. Prawn tails are packed, frozen and distributed and fetch high prices.

The Texas A. & M. University in the U.S.A. reported impressive production figures which were obtained with the white marine prawn, *Penaeus setiferus,* at their experimental farm at Galveston. During 1973 they succeeded for the first time in cultivating 1 960 kilograms of prawns per hectare. At the price of 2,46 American dollars/kg at that time, the above mentioned production, even if only the tails of the prawns were sold, could mean an income of 4 922 dollars/ha. According to Dr. J. Parker, on the staff of the same university, it is possible to reap three harvests in a year under carefully controlled conditions. This means an estimated total income of 10 666 dollars/ha. Unfortunately he gave no figures of expenditure, so that the picture is incomplete.

Over-exploitation of marine resources and the increasing danger of pollution have led fishery biologists to believe that these riches may disappear. Consequently, for over a decade attempts to breed marine prawns in great numbers for release into the sea, have been made in order to counteract the decline in their numbers. The greatest obstacle was that prawn females do not spawn spontaneously in captivity. This implied that egg-carrying females had to be caught in the wild and brought to the breeding station in order to obtain breeding stock. The marine prawns also required special food, and both these factors made their rearing a costly enterprise.

In contrast, the Malayan fresh-water prawn spawns easily in capitivity and can be fed on food of animal or vegetable origin. Unfortunately prawns also have cannibalistic tendencies.

A Malayan scientist, Dr. F.W. Ling, was the first person to succeed in breeding prawns in captivity. During the early 1960's he discovered that their larval stages require brackish water for development. This factor had been overlooked by scientists, as the adults and young prawns may occur in rivers far inland. It was found that, in the wild, planktonic prawn larvae are at some stage of the life cycle washed to the estuaries. At a later stage the young prawns again move upstream from the brackish waters of the estuaries into the rivers.

In South Africa scientists are at present investigating the ecological and physiological requirements of our own fresh-water prawns, in order to unravel the biological factors which may enable them to rear and cultivate our indigenous species. In the Transvaal, research is being done at the Lydenburg Fisheries Institute on the fresh-water prawn species, *Macrobrachium lepidactylus,* which can be found in the Lowveld rivers. Depending on the success of this research, the "Cinderella" of our Lowveld streams may take its place amongst the other highly-priced dishes where it belongs.

Nico van Loggerenberg is doing research on the fresh-water prawn species, Macrobrachium lepidactylus
Photo: E. Young
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The fresh-water prawn is found in the east-flowing rivers, draining into the Indian ocean
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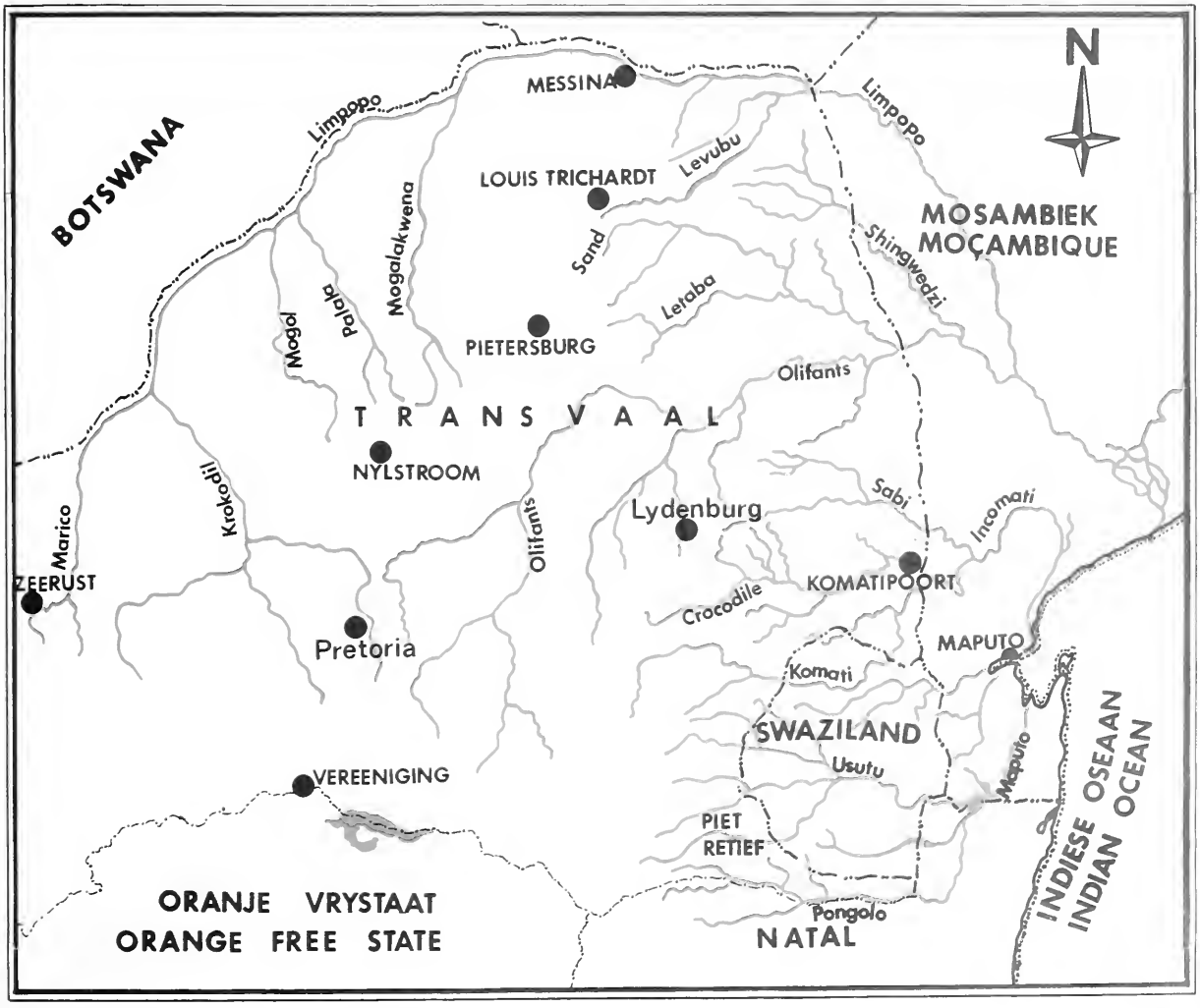

STRIPED HORSES

Dr. B. Penzhorn
Faculty of Veterinary Science University of Pretoria, Onderstepoort

One of Africa's characteristic scenes is a herd of striped horses on the plains or in the bushveld. The zebras and their relatives are inhabitants *par excellence* of the open spaces. They are eminently adapted to this way of life. Having long legs, equines are built for speed. Their strong incisors in both upper and lower jaws enable them to bite off the tough plains grasses, which are then masticated with the long row of high-crowned molars. Their senses are well developed, and they can detect danger over great distances.

The well-known Burchell's or plains zebra, *Equus burchelli,* occurs from the Transvaal and Northern Natal northwards to Kenya. Down south they are distinguished by the light brown "shadow stripes" between the black stripes on the hindquarters, the black muzzle, the body stripes extending around the belly and the fact that the legs are never striped right down to the hooves. They are fairly abundant in the Kruger National Park and adjoining private nature reserves of the Lowveld, occurring on a number of provincial nature reserves, viz. Loskop Dam, Hans Merensky, Percy Fyfe, Rustenburg and Suikerbosrand Nature Reserves, and are also found in increasing numbers on private game farms.

Burchell's zebra live in small herds of a single adult stallion, a few mares and their foals. The stallion and mares remain together for a number of years, but the foals eventually leave the herd.

The quagga, which became extinct during the previous century, was probably not a distinct species, but represented a variety of the Burchell's zebra, which inhabited the plains of the Karoo and the Orange Free State.

Two varieties of mountain zebra, *Equus zebra,* occur in Southern Africa. One variety, the rare Cape mountain zebra, occurs only south of the Orange River and previously it inhabited the mountain ranges of the Southern and Western Cape. Today they are restricted to the Mountain Zebra National Park at Cradock and a few mountain ranges surrounding the Little Karoo, with a few on the De Hoop Reserve near Bredasdorp. The Cape mountain zebras total only about 200 individuals. The other variety, Hartmann's mountain zebra of South West Africa and Angola, numbers a few thousand.

Mountain zebra are characterized by the lack of "shadow stripes" on the hindquarters, legs which are striped to the hooves, an unstriped belly, a grid-iron pattern on the rump, a chestnut muzzle and a peculiar dewlap. Their social structure resembles that of Burchell's zebra.

Grèvy's zebra, *Equus grevyi,* of Northern Kenya, Somalia and Ethiopia is the third zebra species. They are large animals with fine black stripes, an unstriped belly, a chestnut muzzle and prominent round ears.

Equus zebra
Photo: E. Young
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Equus burchelli
Photo: W. Massyn
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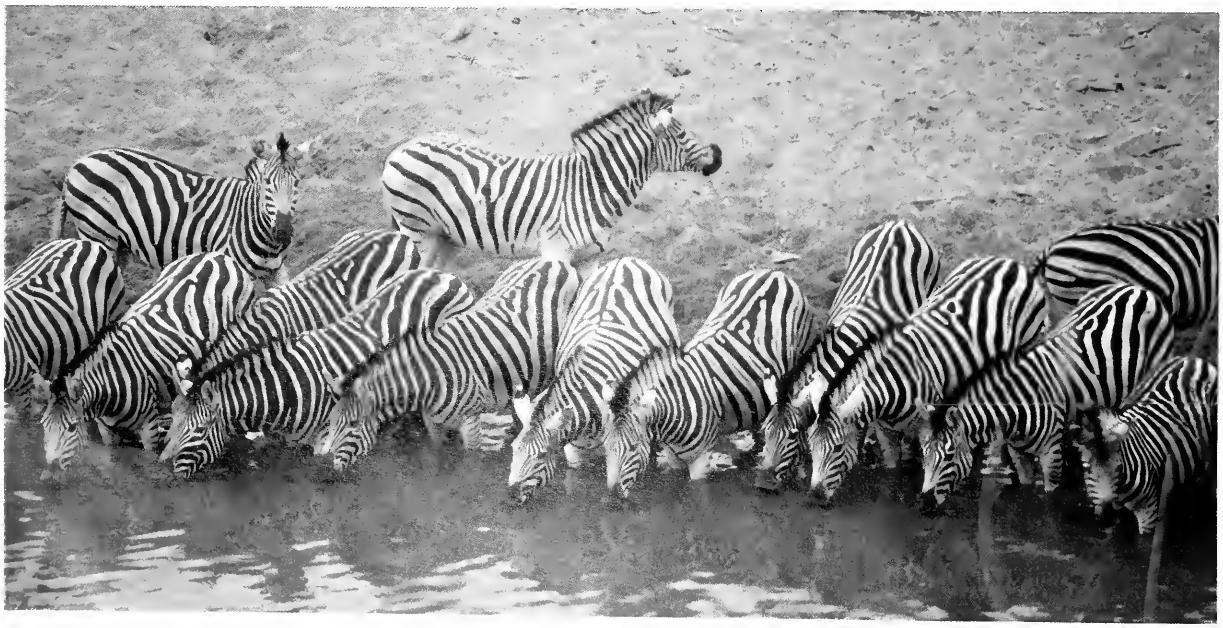
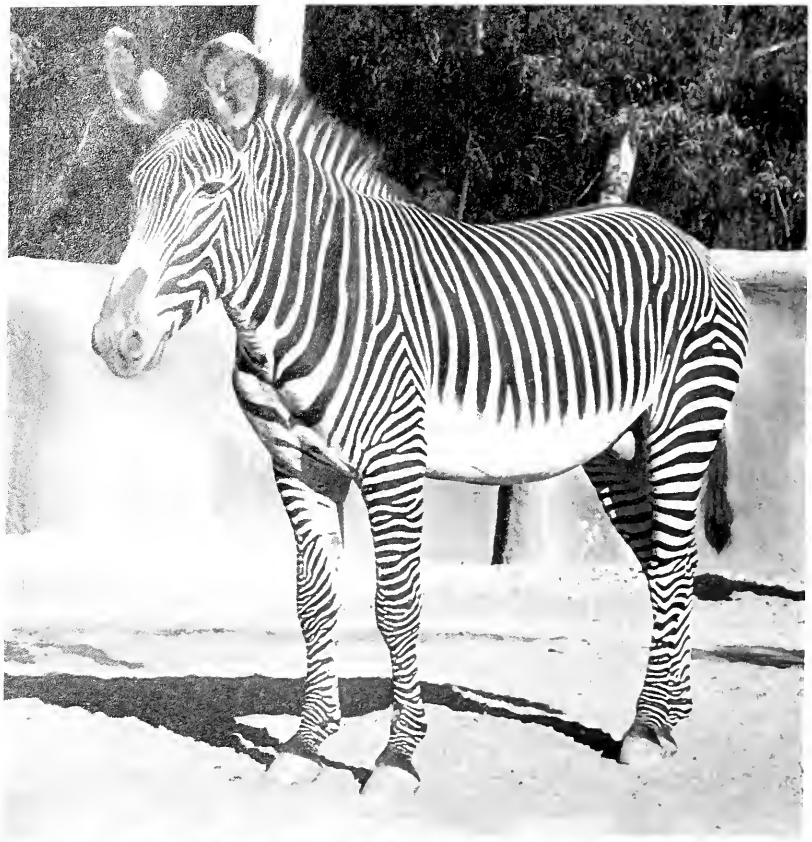


The African wild ass, *Equus asinus,* which is the ancestor of the domestic donkey, still occurs in the wild in the desert areas of Somalia and Ethiopia. The wild ass, *Equus hemionus,* of Asia, also known as the onager and kulan, inhabits the dry parts of Pakistan, Afghanistan and Iran.

The Przewalski Horse, *Equus przewalskii,* from which the domestic horse was bred in ancient times, was probably saved from extinction by zoos. The breeding of this wild horse in zoos was placed on a sound footing through excellent international co-operation. There is even a stud book which is annually updated. A slight possibility exists that a few small herds may still occur in their wild state in Mongolia.

Several attempts were made in the past to break zebras into the harness to be used as draught animals. This resulted in failure and today horses, donkeys and mules are the only equines used as beasts of burden. A striped team showing off at an agricultural show would be quite a spectacle!



Equus grevyi
Photo: B. Penzhorn
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Equus przewalskii,
Photo: B. Penzhorn
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Cecilia Louw
Information Officer
Transvaal Nature Conservation Division
Pretoria

Radiotracking — bats to elephants

A research team of the Division mark an elephant with a radio transmitter to enable them to determine its movements after release.
Photo: J. Deeks
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The movements of the black backed jackal can be determined with the aid of telemetric equipment
Photo: W. Massyn
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The emphasis in nature conservation has, during the past decade, changed from pure protection of wildlife to the management and control of populations. To maintain a balance of animals and plants in a specific area, information of a different and much more precise nature has become essential. Studies of the behaviour of wild animals, the interaction between different individuals and other factors affecting their ecology, have become much more important. To gather this information, it became essential to make use of the tremendous potential of modern technology, such as electronic tracking equipment.

It has become common practice to tag animals with radio transmitters to enable the researcher to track his study animals. The discovery of the transistor and miniature electronic components made it possible to construct equipment small enough to be carried by an animal the size of a mouse without unduly affecting its behaviour. Because these transistorized units operate on very low power, small modern batteries can keep them working for a period of up to two years.

It is now possible for the researcher to monitor with great accuracy, and from a distance, the movements of free-roaming animals in their natural environment. Of even greater significance is the fact that these techniques allow scientists to locate specific individuals at any time and to study the most intimate details of their daily lives.

To determine the movements of the black-backed jackal, a reseacher of the Transvaal Nature Conservation Division, Willem Ferguson, caught several of these animals and marked them with radio transmitters. With the aid of telemetric equipment, installed in an aeroplane and four-wheel driven land vehicles, it was found that some jackals stayed in a particular area of about 20 km², while others utilised a larger area of about 200 km². From the aeroplane it was possible for Willem and his assistant, Thys de Wet, to track radio-marked jackal over a distance of up to 45 km. Similar equipment and techniques were also used by Max Keith to study the hunting behaviour of the caracal.

The Nature Conservation Division recently rendered assistance with the relocation of a group of young elephants at Londolozi in the Sabi Sand Game Reserve. This project was the first of its kind in Southern Africa and it was feared that the animals would return to the Kruger National Park where they had originally been caught. After their release, the movements of these elephants were closely monitored. This was made possible by a radio transmitter placed around the neck of the leader of the group. Petri Viljoen, who was responsible for the follow-up work, found that during eleven months, the elephants only moved four kilometers away from the boma where they had been kept before release. This proved that the relocation of captured wild elephant could be a practical proposition.

Fruit-bats in the North-eastern Transvaal are held responsible for considerable damage in certain litchi orchards. These animals feed on up to nine litchis per bat per night. To determine the origin of the culprits responsible for the damage, several bats were caught in one of the orchards and marked with radio transmitters. A complete transmitter unit weighed only 8 gm and was fixed between the shoulders of a bat with elastic glue. Niels Jacobsen was enabled to locate the marked animals at a distance of up to 10 km.

The bats were traced to a cave 24,5 km from the orchard. They covered this distance in about an hour, which means that they moved at an average speed of 16,5 km/h.

Without radio tracking aids, the scientist would have to depend on direct observations. It is, however, seldom possible to follow a specific animal on a routine basis for any length of time. Clearly, modern electronics, have provided the researcher with useful aids, without which certain important research projects would never have been possible.

From an aeroplane equipped with sophisticated telemetric equipment radio-marked animals can be traced over a distance of up to 45 km

Photo: Transvaal Nature Conservation Division

A complete transmitter unit can be fixed between the shoulders of a bat, without unduly affecting its behaviour

Photo: P. Viljoen

BIRDS OF PREY IN DANGER

Warwick Tarboton
Senior Professional Officer
Transvaal Nature Conservation Division
Nylsvley Nature Reserve

Of the bird group known collectively as birds of prey – the vultures, eagles, hawks, falcons and owls – 21 species are considered rare, peripheral, endangered or vulnerable in the recent *South African Red Data Book* – Aves (Siegfried et al 1976). Some of these species are rare or vulnerable because South Africa is at the extreme edge of their normal range, while others are so little known that their assumed rarity is only speculative. There is however, enough evidence to show that many species have declined in numbers and disappeared from areas in which they formerly occurred.

A project has recently been launched by the Transvaal Nature Conservation Division to assess the status of the species occurring in the Transvaal. The aim of this project is to assess, as accurately as possible, the numbers of breeding pairs of each species, the main distribution of the population of each, and to gain some estimate of the annual reproductive rates of each. From such information one can identify those species which face the most immediate and serious threat and take steps to ensure their survival.

The Transvaal is well represented in raptors: 59 species have been recorded here, or 71, if the owls are included. Amongst them are the Secretary Bird, 6 vulture species, 5 kites (and allies), 15 eagles, 5 buzzards, 8 goshawks, 6 harriers, 12 falcons and a fish-eating hawk called the Osprey. Fourteen of the species are non-breeding migrants to the area and 49 species breed, or have been known to breed, here. Eighteen of these are listed in the Red Data Book.

Warwick Tarboton checking a nest of a Black Sparrow Hawk for prey remnants
Photo: L. Stanton
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Wahlbergs' Eagle
Photo: L. Stanton
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Black Sparrow Hawk
Photo: G. Batchelor
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Little Banded Goshawk
Photo: W. Tarboton
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The reasons for the decline in numbers in certain raptors is obscure, or at least speculative, but some broad generalizations can be made in this regard. Man-made changes to the environment have undoubtedly contributed more than any other factor to the change in status of many species. The extensive clearance of primary vegetation and its replacement by monocultures of crops or commercial plantations has eliminated some species from large areas. By the same token the newly created habitat has extended the range of other species. As an example, the rodent-eating Black-shouldered Kite is now probably the commonest breeding raptor in the Province. It has, however, replaced the much more diverse raptor community which the former habitat supported. Before the era of dam-building the Fish Eagle was undoubtedly much rarer and more restricted in range than it is today. This has again been at the expense of a more diverse raptor community that inhabited the now-flooded valleys.

As a group, the carrion-eating raptors have fared badly; all have declined in numbers and many have disappeared from large parts of their former range. The best-documented in this group is the Cape Vulture, which is now restricted to four or five breeding colonies in the Transvaal. Less well known, but cause for even greater concern, is the spectacular Bateleur Eagle. It used to occur throughout the bushveld area of the Province, but the past two decades have seen its virtual disappearance from all but the confines of the Kruger National Park. A third jeopardized species in this group is the Tawny Eagle. These carrion-feeders are, to a large extent, dependent on a continuous source of dead animals. Where predators still occur, such as in the Kruger Park and adjacent areas, they are still common, but where they depend on dying livestock they lead a tenuous existence, and furthermore face unjustified persecution from stockfarmers.

Direct human persecution certainly has had some impact on a number of species, mostly the large and obvious which provide easy targets. Only one species is however probably seriously threatened from this quarter. This is the Martial Eagle. One has only to compare present-day densities of this species in the Kruger Park with outside areas to see how its numbers have declined. In common with the other large eagles, pairs have very large "home ranges" (200 km² or more) and very low population recruitment rates, of the order of 0,3 young per pair per annum, and human persecution can thus effectively eradicate an entire population from an area in a short time. Martial Eagles, and some of the smaller species as well, take poultry on occasions, especially when it is left to wander temptingly around the farmyard, but it is not only the poultry-taking individuals that are shot. Regrettably, large numbers of raptors are senselessly and needlessly destroyed by people (a) ignorant of the law (all raptors are protected by law) and (b) ignorant of the great service that many species perform in preying on rodents, locusts and other pests. Rather than being killed, rogue individuals which persistently take livestock could be trapped and either released in "safe" areas, or else used for display or breeding purposes in zoos.

A fourth factor which potentially affects raptor populations, although its significance has not been assessed in this country, is the use of pesticides in agriculture. The devastating effect of pesticide residues on raptor populations in Europe and North America has been exhaustively studied. Pesticides enter the food chain through the primary consumers and concentrate in the predators which feed on them. They have a chronic rather than lethal effect in raptors which results in reduced breeding success and a consequent population decline. In a matter of a decade one race of the Peregrine Falcon in North America was brought to virtual extinction through DDT usage in agriculture. Today, with the use of DDT prohibited, the species is being reintroduced, at great expense, through captive-bred birds and birds taken from non-contaminated areas. In South Africa there is virtually no evidence one way or the other as to whether or not our raptor populations are being affected by pesticides.

Now for the commercial! Any information on raptors in the Transvaal would be welcomed and can be directed to the author. Of special value are the localities of sightings of any of the large species, localities of any nests and first-hand observations of any predation by birds of prey, especially where these concern domestic stock. This information should be sent to P.O. Box 327, Nylstroom 0510.

watching the lovable klipspringer

Graham G. Catto
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Photo: J. van Jaarsveld

Rocky outcrops are the ideal place to search for the shy klipspringer. If you sit quietly for a while they will appear and having noticed you might become curious and jump a little closer, landing stiff-legged with a thudding noise. But a sharp movement by you will cause it to snort with alarm and bound away from rock to rock on the tips of its hoofs. Careful observation will reveal blunt, cylindrical hoofs and wavy, close-lying, coarse and pithy hair coloured a speckled yellow and brown.

The Klipspringer, *Oreotragus oreotragus,* was first described in 1782, although klipspringer have been around much longer: a similar skull to that of this species from half a million years ago was found near Makapansgat in the Transvaal, and another skull was found in sub-Saharan Africa, where biologists can identify eleven subspecies.

The klipspringer's habitat varies from semi-arid to high rainfall areas, and in places its distribution overlaps with that habitat of the grey duiker and the dik-dik. The subspecies in the Transvaal is, *Oreotragus oreotragus transvaalensis.* It occurs, amongst other places at the Blyderivierspoort, Hans Merensky, Loskop Dam, Ohrigstad Dam, Percy Fyfe and Rustenburg Nature Reserves and in the Kruger National Park.

The little animal is slow and vulnerable on level ground away from its rocky home: the Tswana used to catch the young klipspringer and pinch them to make them squeal in the belief that it would bring rain.

It has a home range of approximately 16 ha and feeds on the succulent leaves of aloes, Naboom or *Euphorbia,* bobbejaanstert, *Xerophyta retrinervis,* and wild peaches, *Landolphia capensis,* as well as other wild fruit. This diet explains why klipspringer so seldom drink water.

The female usually gives birth to one lamb after seven months pregnancy, but there are conflicting reports over whether lambs are born only in the rainy season, or at any time of the year.

During the heat of day, one might become a little bored watching the klipspringer, for they spend most of their time in the shade of rocks and bushes, sometimes lying down to sleep. At least one individual is watchful and full-time "on guard".

Klipspringer are fond of sunning themselves with back arched and all four feet closely grouped together on a rock. Occasionally a Redwing Starling will search the klipspringer for ticks.

If you were close enough to the territory boundary of the group you were watching, you would notice them depositing their dung on large mounds or middens, they also rub their faces against twigs in the area in order to deposit secretions from their dark eye-glands. These are apparently ways of marking their territories.

Klipspringer are particularly vulnerable hunting targets for they feel secure perched high on a rock face and may stupidly watch the hunter pull the trigger. Klipspringer were hunted in the past for their hair (to stuff saddles), hides, and their meat, which is reported to be very good. However, today a permit is required to hunt them. Klipspringer were also hunted elsewhere in Africa in attempts to control the tsetse fly.

The dainty little klipspringer standing sentinel on a kopje is a sight you will never forget.

Roodeplaat Dam Nature Reserve

Laurie Oates
Chief Professional Officer Management
Transvaal Nature Conservation Division
Pretoria

For the past five years the Transvaal Nature Conservation Division has been actively developing the land around the Roodeplaat Dam as a nature reserve and outdoor recreational area for the large urban population of nearby Pretoria and the Reef. This responsibility, as well as the control of all water-related sports on the dam, was entrusted to the Transvaal Provincial Administration by the Department of Water Affairs in 1972.

The reserve, only 16 km from the capital city, was proclaimed in 1977, has a land-surface area of 1 300 ha and a water-surface of 395 ha. The large number of visitors has already made it clear that this is one of the Transvaal's most popular outdoor recreational areas. With present-day fuel restrictions, more attention is being devoted to bringing recreation in nature nearer to the people.

Both the water-surface and surrounding land have been zoned for specific activities. The water-surface has been zoned so that sports such as rowing, canoeing, motor-boat-angling and shore-angling will not conflict with one another. Because these activities disturb birds, the upper reaches of the dam have been cordoned off as bird sanctuaries.

The land surrounding the dam has also been zoned. There are basically three areas:

- The western high-density recreational area is very popular amongst anglers, and catches of blue kurper, black bass, carp and barbel are very good. Picnic facilities have been provided for day visitors and camping and caravan sites have been attractively laid out in clusters amongst the acacias and other indigenous trees. A clubhouse has been made available to canoeists and rowers for whom an excellent system of racing lanes for regattas has been provided. Visitors to this area will be able to linger a while and orientate themselves in the visitors' centre near the entrance gate. The centre will house an aquarium and informative nature-conservation displays.

a major outdoor recreational area

The southern part is being conserved as a natural area. The vegatation is mixed grassveld with scattered and clumped bushveld trees. Here the Division has successfully re-established game animals such as impala, zebra, waterbuck, kudu and sable antelope. Notwithstanding the limited suitable habitat for large numbers of duck and geese, the birds of this part of the Transvaal are well represented here by some 244 species.

A visitor survey conducted at the dam clearly indicates that the simple and healthy activity of walking is one of the more popular pastimes for those not solely intent on catching fish. A nature trail which winds its way through bush, open veld and along the water's edge offers walkers a closer contact with nature and its associated wildlife.

Organised youth groups will be able to camp out in tents in the special youth camp where cooking and ablution facilities are provided. An open-air amphitheatre for information programmes and concerts will also be developed.

- In the eastern recreational area – perhaps the most beautiful part of the nature reserve – two separate resorts are to be developed for Coloured and Indian people, by the Public Resorts Board. Temporary amenities are already available.

The planning of this nature reserve is the first of many similar recreational areas that this Division has tackled on so large a scale. Much of the development is now complete and the reserve's ever-increasing popularity proves that such areas provide one of mankind's basic needs.

Impala
Photo: L. Stanton
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Kudu
Photo: D. Wolff
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Angling at Roodeplaat Dam
Photo: L. Stanton
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View overlooking Roodeplaat Dam
Photo: L. Stanton
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Waterbuck
Photo: L. Stanton
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Fulvous tree duck
Photo: L. Stanton
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fauna & flora

Transvaal Nature Conservation Division

FAUNA & FLORA

TRANSVAAL NATURE CONSERVATION DIVISION

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CONTENTS

The black-footed cat . . . . . [illegible]
Euphorbia – poisonous but useful . . [illegible]
Kingfishers of the Transvaal . . . 4
Odd but interesting bird 9
The African elephant – some interesting facts and figures . . . 10
Do witchdoctors pose a threat to rare plants and animals? 15
New roan antelope breeding herd established 18
Outdoor recreation in the Transvaal 20

Cover photo: Witchdoctor with traditional headdress
Photo: Lorna Stanton

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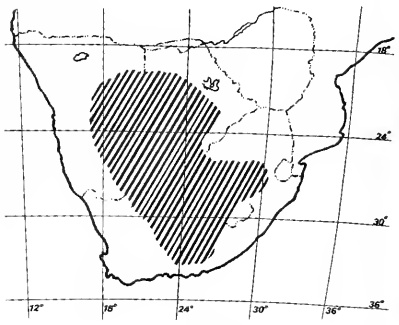


Distribution of the black-footed cat
Map: H. van Staden

Being the smallest representative of the family Felidae in Southern Africa, far less is known about the black-footed cat, *Felis nigripes*, than about its relatives like the lion, leopard, cheetah or African wild cat. This is doubtless due to its small size, nocturnal and secretive habits, solitary nature and its restricted distribution in the South African Sub-region.

The colloquial name 'black-footed' is unfortunate for, while it is true that the underparts of the feet are black, this cat's close relative, the African wild cat *F. libyca*, which has a far wider range of distribution, also has black feet, a fact which has led to misidentification and reports of black-footed cats far outside their normal limits of distribution.

While there is some variation in the overall background colour, populations from the northern areas, i.e. *F.n. nigripes*, are paler than those from the southern *F.n. thomasi*. The size, colour and mark-

THE BLACK-FOOTED CAT

ings nevertheless clearly distinguish the species from the African wild cat. It is small, not over 60 cm in overall length as opposed to the 90 cm of the African wild cat, the legs and tail are shorter and the back and sides with a distinct and characteristic pattern of spots and bars standing out clearly against the tawny background.

Black-footed cats are particularly associated with an open habitat, which provides some cover in the form of stands of tall grass or low scrub. Being disturbed, they will quickly retreat to this sanctuary and also utilise it to rest in during daylight hours.

They will, however, also use springhare or antbear holes, or holes in termite mounds. This more substantial type of cover provides shelter for the litters which consist of two to three young, born during the summer months from November to March.

In stomach samples from Botswana, rats and mice occurred as the commonest food items. Spiders, predominantly hunting spiders, ranked next, followed by reptiles, including the spiny agama; insects, including grasshoppers and beetles, and birds, mainly terrestrial species such as coursers, larks and pipits.

All the prey species are of small size and although one hears reports of their killing lambs, this is extremely unlikely and should be discounted. The reports probably arose from a misidentification of the species involved. Visser, writing in the *Landbouweekblad* of 1975, in fact questions whether they are, on account of their size, capable of dealing even with a full-grown chicken.

Even if youngsters are taken before the eyes are open and reared by hand, black-footed cats are intractable in captivity, lowering their ears, arching their backs, spitting and retreating to dark corners on approach. They may even attempt to attack their owners. For their size they are vicious and aggressive, quite unlike the African wild cat, which, reared under the same conditions show some independence but lends itself more easily to domestication. One cannot but admire this independence of spirit put into words by Kipling "I am the cat, I walk along and all places are the same to me" which, in fact, epitomises the black-footed cat even more closely than its larger and closer relative, the African wild cat to which he was referring.

The black-footed cat ranks among our more attractive and interesting small carnivores and is worthy of more detailed study than has been afforded it up to the present. Although nowhere common, the black-footed cat has its part to play in assisting in the control of rats, mice and insects.

EUPHORBIA
poisonous but useful

C.S. v. H. Burger
C.R. Swart High School, Pretoria

The Euphorbiaceae constitute a large family of plants, which is divided into more than 250 genera and 6 000 species. The largest and most interesting tribe is the Euphorbieae. South Africa, especially the drier regions of the Republic is the home of the greatest variety of these exceptional plants.

The name *Euphorbia* has an interesting origin. In 25 B.C. King Juba of Mauritania discovered an interesting plant on Mount Atlas. Because of its succulent nature, he named it after his corpulent physician, Euphorbus. This was *E. resinifera*, a collector's item.

The popular local name of Noors implies harshness and sharpness, and is often coupled with "doorn" (thorn). Melkbos is often used and is quite descriptive too. "Naboom" denotes a tree first of all, and the prefix "na" is a corruption of the Hottentot term "Gnap", meaning strong and energetic, emphasising the size and vigorous growth of the trees.

In *De Superfactatione* (± 430 B.C.), a work written by Hippocrates, the plant *Tithymalis* was first mentioned – a name which the ancients used for the *Euphorbia*. Their interest centered mainly on the milk (latex) of the plant which was supposed to have medicinal value. Early in the sixth century, hardened latex (gum) was prescribed by Alexander of Trolles as a treatment for diseases of the head, stomach and bladder. In 930 A.D. Mesue suggested it to be used as a snuff to counteract loss of memory and lethargy. Today it is often used to remove warts from animals.

The latex is toxic and in some cases lethal. If brought into contact with the eyes, excruciating pain is experienced, and sometimes blindness results. Instances are recorded where cattle, sheltering under *Euphorbia* trees from a storm, lost all the hair on their backs when latex dripped on them from the bruised limbs of the trees.

Bantu tribes have many uses for the *Euphorbia*. The Xhosa father plants two *Euphrobiae* when twins are born in order to keep away witchcraft. The Sekukuni people plant *Euphorbia ingens* close to each other to form a hedge around their fields. Dingaan had his throne under an exceptionally large specimen of the same plant. In those areas where the plants grow near fishing waters, the branches are cut, bruised and thrown into pools. Many fish die and although poisoned, are quite edible. In the bushveld many birds, some even with the size of a pheasant, are caught with birdlime made from the latex. In the Noorsveld, in the Jansenville area, more than 5 000 km² is covered in *E. coerulescens* which is used for cattle fodder.

The great attraction of these plants lies in their varied forms and unique flowers. These flowers are bisexual, each composed of one female flower surrounded by as many as twenty male flowers which are often clustered in groups of five. The *Euphorbia* can withstand almost any type of climate except heavy frost and an excess of water.

Euphorbia *species occur almost everywhere in the Republic and abound in the drier regions of the country* ▼
Photo: D. Wolff

A *Euphorbia* species in bloom ►
Photo: Transvaal Nature Conservation Division

kingfishers of the Transvaal

Peter Barichievy
Nature Conservation Officer, Transvaal
Nature Conservation Division, Letsitele

Striped Kingfisher ◄
Photo: P. Barichievy

Grey-hooded Kingfisher ▼
Photo: P. Barichievy

Malachite Kingfisher ▼▼
Photo: P. Barichievy

Of all the beautiful birds found in South Africa, surely the kingfishers must rank amongst the most colourful. We are fortunate in having some ten different species of kingfishers present in South Africa, of which nine occur in the Transvaal. Although called kingfishers, they nevertheless do not all eat fish. We therefore can divide this family, for simplicity's sake, into two types namely land kingfishers and water kingfishers. The land species which are sometimes found far from water, eat insects and small reptiles. The water kingfishers are true fishermen and feed on aquatic prey.

The land kingfishers include the following: Striped, *Halcyon chelicuti*, Brown-hooded, *H. albiventris*, Grey-hooded, *H. eucocephala*, and the Woodland or Angola Kingfisher, *H. senegalensis*. The smallest kingfisher in South Africa is also included in this group, namely the Natal Kingfisher, *Isipidina picta*.

The true fishermen include the Giant, *Megaceryle maxima*, the Pied, *Ceryle rudis*, and the two blue kingfishers, the Half-collared, *Alcedo semitorquata*, and Malachite, *Corythornis cristata*. The Giant Kingfisher is the largest of the family, being the size of a small sea-gull. The male and female are easily identified, as the female has a rufous belly and black-and-white speckled chest, whilst the male has a reddish chest and black-and-white belly.

Observations carried out on the land species show that these birds have a varied diet. The Brown-hooded for example, brings to its chicks spiders, scorpions, crickets, frogs and lizards and have even been known to occasionally feed on young rats and young puff-adders. The parents do not tear the food apart as eagles and hawks do and it is swallowed whole.

The Woodland and Grey-hooded Kingfisher appear to concentrate more on insects like grasshoppers and crickets. Observations and photographic sessions carried out in December 1977, revealed that a Woodland pair brought long-horn grasshoppers and crickets to the chicks and never fed any reptiles to the youngsters. The year before, observations carried out on two pairs of Grey-hooded Kingfishers showed that they too, mainly fed on small insects. These observations were carried out on the farm Scrutton in

Brown-hooded Kingfisher ◄
Photo: P. Barichievy

Half-collared Kingfisher ▼
Photo: P. Barichievy

Woodland Kingfisher ▼▼
Photo: P. Barichievy

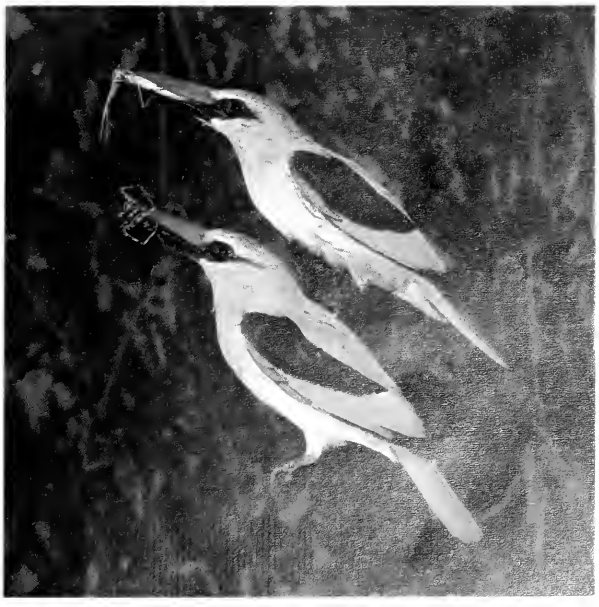
the Northern Transvaal.

The water kingfishers basically employ the same hunting technique in as much as they sit on some favourite perch and watch below for their prey. Having spied a meal, they pounce down, either into the water for fish or aquatic insects or on to the ground for their prey. Some kingfishers (mainly the Natal and Brown-hooded) sometimes hawk insects that have fallen into the water. If uninitiated, one might think that these land kingfishers have taken up fishing. The Pied Kingfisher is the one that hovers above the water, remaining in one place as if suspended, whilst searching the water below for some unsuspecting fish.

The Malachite is vividly coloured and can easily be followed as it skims inches along the water, in its characteristic darting flight. It quite often lands on some thin reed which bends and bends until the kingfisher is just above the water, and one gets the feeling that at any moment it is in for a ducking. It is a true fisherman, but also eats insects and frogs, and so does the Half-collared. In fact, the Half-collared and Malachite Kingfisher are fairly similar in habits. Apart from fish the Giant Kingfisher accounts for a great number of crabs.

The land kingfishers nest in either old woodpecker excavations or in a burrow dug into a sand- or river bank. The Woodland and Striped Kingfisher uses old woodpecker nests, laying two to four white eggs. During the nesting period, the Woodland in particular becomes very aggressive, chasing all competition in the form of birds and squirrels away from the nest-site. The Natal, Grey-hooded and Brown-hooded nest in sandy burrows of from a half to one and a half meters deep. The burrow soon becomes filled with insect remnants and such like, which gives it a characteristic evil smell.

The kingfishers are well represented over most parts of the Province whereever favourable conditions occur. On the Hans Merensky Nature Reserve all nine of the Transvaal species are found. In fact, at the time of writing, a pair of Woodland Kingfishers was nesting in an artificial nest-box in front of the Nature Conservation Officer's home, offering many hours of rewarding observation.



Pied Kingfisher ►
Photo: P. Barichievy

Giant Kingfisher ▼
Photo: P. Barichievy

odd but interesting bird

Dr A. Kemp
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Ground Hornbills are probably of the most easily recognised of all South African birds. They are the size of a turkey, pitch-black with sturdy legs and an approximately 20 cm long pickaxe-like bill. The brilliant red cheek- and throat skin is not feathered and is usually inflated. The females have deep blue areas on the throat, and immatures have a dirty-cream throat skin when hatched. The full red colour only develops when they mature at the age of six years.

In addition to their weird appearance, Ground Hornbills have a most interesting life style. They go about in groups comprising usually four or five members. The dominant pair which forms the nucleus of the group, is responsible for reproduction. The rest of the group usually consist of additional adult males and/or immatures of various ages. It is uncommon to find an additional adult female present in a group. Apparently the females leave once they reach maturity while the young males remain in the group.

Each family of Ground Hornbills permanently lives in a territory of about 100 km² and the boundaries are defended by the adults against neighbouring groups. The young males help defend the territory by swelling "Dad's" army. They also make their presence tolerable by helping to bring food to the nest during the breeding period. The immatures also assist in this respect, and since they are not yet sexually developed, they are no competition to their parents. In this type of organisation, males profit by having access to a territory that they may later inherit and be able to breed in. The females move out and try to find vacancies in other groups. This may be risky, but once they are established as dominant female of their own group, their position is secure.

These birds also breed very slowly. They nest in hollow stumps and tree trunks and even on rocky ledges. In the early summer the female lays two eggs on a lining of dry leaves. She remains almost permanently on the eggs while the other members of the group feed her. When the eggs hatch, one of the chicks invariably dies of starvation – having just been there to ensure that the breeding cycle is not disrupted by an addled egg. The surviving chick is reared by the provisioning efforts of the whole group. The nesting cycle comprises almost five months. Groups frequently fail to breed for several years in succession. A nesting attempt might even fail for several reasons. Furthermore, the immatures still have to survive a minimum of six years before they are capable of breeding.

It is possible that Ground Hornbills in the Transvaal are under stress when the fact that they have been common in many of the bushveld and grassland regions in the years before 1940, is considered. Nowadays they only occur in undisturbed parts of the eastern Lowveld and in a few areas of high-lying grassland (as in the vicinity of Pilgrim's Rest, Bourke's Luck and Haenertsburg). A few birds still occur along the Limpopo to about 80 km west of Messina, but noticing single immatures in this area indicates that the population is in trouble. It will be appreciated if anyone with information on the Ground Hornbill will contact the Transvaal Museum (P.O. Box 413, Pretoria) so that the precise status of the species can be determined.

Ground Hornbills are very scarce and deserve special protection ▼
Photo: Transvaal Nature Conservation Division

THE AFRICAN ELEPHANT
some interesting facts and figures

Dr E. Young
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"Now take a look at Behemoth, the masterpiece of My animal creation." Job 40:15 ▼ ►
Photos: D. Wolff

One cannot help being astonished on seeing a really big full-grown elephant. There is so much to this unique piece of natural engineering. Did you, for instance, know that:

– this colossal beast can attain a speed of 38 km/h, which is considerably faster than the speed of an average human athlete.

– an elephant baby, weighing about 90 kg at birth, can grow in a few decades into a massive six to seven ton beast, standing over 400 cm at the shoulder.

– when tracking elephant, measuring the circumference of the forefoot spoor could be of some value in determining age and size. In a very big elephant the circumference can exceed 176 cm.

– the elephant is sexually mature at about 8–12 years and a calf (exceptionally

twins) is born after a laboriously long gestation period of 22 to 24 months, a record in the animal world!
– a nursing calf does not suckle with its trunk but, by means of its mouth. Elephant milk is extremely nutritious, having a high vitamin C content and containing about four to five times as much butterfat as ordinary cow's milk. The elephant calf is weaned at about two years of age and, on an average, a calf is born every four years.
– elephants have a very strong family bond and maternal care is highly developed in comparison with the behaviour of most other species. Elephant cows generally do not hesitate to risk their own lives in attempting to protect their offspring. When approached by a hunter an elephant cow may try to lift a wounded calf, using her tusks, trunk and feet. When all attempts fail she normally launches a desperate and often suicidal attack. Like baboons, elephants have been seen to drag and carry the carcasses of their dead babies along. Although they are also known to pick up and carry bones and other carcass remains of dead companions, stories of elephant graveyards are a fallacy.
– there are 7 700 elephants in the Kruger National Park and on adjoining private land, and that the small populations in the Knysna forest and Addo Elephant National Park are isolated sub-populations of the same species.
– vast amounts of African bush and grass are consumed daily by elephant and converted into humus to fertilize depleted ranges. A big bull can consume an estimated 300 kg of plant material in one day! Researchers in the Kruger Park found that about 50% of the elephant's diet consists of grass. In winter, when water is scarce and the grazing generally very dry, elephants are frequently found along rivers and in low-lying areas, feeding on green leaves and pastures. Calculations revealed that, by doing so, each elephant can obtain an average of 72 litres of additional water from the relatively succulent vegetation.
– some elephants, notably cows, and especially animals from certain populations, i.e. Addo elephants, tend to be tuskless. Record mass and length of individual elephant tusks are in the vicinity of 102 kg and 320 cm respectively. Elephant tusks are comparable to the upper incisors of other animals. Their cheek teeth are lost and replaced in a certain chronological order, which can be used to determine the age of dead or anaesthetised individuals. Obviously, when the last cheek-teeth are lost, the elephant has reached the end of its lifespan, its maximum life expectancy being about 70 years.
– a full-grown elephant bull can drink about 315 litres of water. He can suck up 17 litres into his trunk at one go! The daily water consumption of an average sized elephant is, however, much lower, in the vicinity of 88 litres. That is still a lot, about as much as would be required by 4 buffalo, 6 zebra, 11 blue wildebeest or 66 impala.
– elephants are peculiar in not having sweat glands. Yet, the elephant can excrete more "sweat" by a specialized process of diffusion, from parts of its ear surfaces, than can a zebra or impala with about 1 000 to 2 000 sweat glands per square centimetre of skin surface. Through this process and by means of evaporative cooling, blood running through the elephant's ears is cooled by about 6°C.
– elephants are sometimes more in need of water for cooling than for drinking. This is understandable if one takes into account that heat production in one elephant can exceed that of 30 men. Animals which had been without water for more than three days, were seen to run to the nearest water to first wet their ears before starting to drink. Away from water, elephant cows have been observed to suck water with their trunks from their throats to spray their babies and their ears on extremely hot days in order to promote the vitally important process of evaporative cooling. No other species is known to be able to do this. On hot days they are seldom further than about one kilometre from the nearest water and then visit streams, dams and veld pans up to 20 times a day to cool themselves by spraying and wallowing.
– elephants are excellent nature conservationists. They may be destructive but also do a lot of good by maintaining healthy and productive populations of plants and animals. Researchers in Kruger Park found that the number of trees killed by causes other than elephant action, exceed those killed by elephant. Furthermore, elephants may push over trees into dongas or onto bare patches thereby unknowingly combating soil erosion and creating favourable conditions for the establishment of grass and other plants on overgrazed and depleted pastures. On the other hand, thick bush which may be too dense to be occupied by plains-loving species, such as blue wildebeest, zebra and impala, are frequently opened up by elephant to benefit these other species. By digging sand pits in dry river beds, water is made available by elephants to other species in arid regions, thereby also contributing to the more even distribution of game, and the better utilization of available grazing. Many more examples of the beneficial role of the elephant can be thought of.
– many unfounded beliefs and myths are still in existence about this remarkable animal. For instance, what is the significance of the big subcutaneous temporal gland, situated between the eye and ear opening of the elephant? Does it really have some communication function? One thing is sure, when the secretion of this gland flows down the elephant's cheeks, the animal is invariably in a foul mood and should be kept at a distance! Furthermore, hunters' stories about pygmy elephants, supposed to be living somewhere in the thick forests of darkest Africa, seem false, as is the story that elephants, said to become drunk after having gorged themselves on ripe, fermenting marulas. But, these stories do little harm – they all contribute to the atmosphere when hunters around the camp-fire tend to turn their conversations to highly philosophical discussions of the world's biggest land mammal and one of nature's most wonderful creations . . . the African elephant.

An elephant can draw up 17 litres of water in its trunk and the daily water consumption of an average sized elephant can be as much as 88 litres◄
Photo: E. Young

DO WITCHDOCTORS POSE A THREAT TO RARE PLANTS AND ANIMALS?

H.L. Pettifer
Senior Professional Officer, Transvaal Nature Conservation Division, Pretoria

The traditional witchdoctor still fulfils an important function in the everyday life of the African community. He, for instance, settles disputes, gives religious guidance, protects the property of individuals, safeguards the village from evil spirits and heals the sick. It is thus apparent that the title 'witchdoctor' is inappropriate.

The remedies and ceremonies performed by witchdoctors vary considerably from one tribe to another. A wide variety of commodities is used and accordingly they may practice as herbalists diviners and/or sorcerers. Some potions are derived from mammals, birds, reptiles and insects and are often mixed in a dried or burnt form with various roots and herbs. Many of the remedies are handed down from generation to generation and where the components were perhaps once easily obtained, they are now in great demand. Obviously the more rare an item becomes, the more expensive it becomes.

The powers of the witchdoctors' medicines are frequently associated with the characteristics from which they were derived. For example the heart of a lion is often used to produce strength and courage, a portion of the shell of a tortoise security and solidarity, and the sinew of a hare swiftness. Due to the chameleon's ability to blow itself up, it is commonly used in a dried and ground form for patients losing weight. The python is linked with strength and madness in fighting as well as to produce death in the house of an enemy in certain cases.

Reckless profiteering has to a large extent replaced the once respectable practice of the traditional witchdoctor, more especially in the larger cities. Today witchdoctor quacks often make more money than conventional doctors and the trade in the commodities used by them has become big business. Due to the secrecy involved with the remedies, an estimate of the trade in protected animals and plants is most difficult to make. It may be sufficient to say that this uncontrolled racketeering in the items used by witchdoctors poses a very real threat to many of the rare and endangered plants and animals in Africa, and is cause for grave concern for certain species such as the aardvark and scaly anteater.

The witchdoctor's dolos consist of a variety of bones and artifacts. These ones include bones of aardvark, klipspringer, scaly anteater, baboon, lion, cheetah and hedgehog ◄
Photo: L. Stanton

Rare animals such as the scaly anteater is much sought after by witchdoctors for the production of medicine ►
Photo: L. Stanton

Due to the chameleons ability to inflate itself, it is used for patients losing weight ►►
Photo: H. Pettifer

The urban witchdoctor's backroom where the traditional remedies are concocted ►►►
Photo: L. Stanton

Cecilia F. Louw
Information Officer Transvaal Nature Conservation Division, Pretoria

New roan antelope breeding herd established

The roan antelope *Hippotragus equinus* is one of the larger and more spectacular antelope of Africa. Population numbers and distribution areas of this species have shown alarming declines within recent decades. In South Africa, the roan antelope is nowadays found in the Transvaal only. The Kruger National Park, being considered as its most important conservation area, has only some 250 to 300 roan antelope. The number outside this area in the Transvaal is estimated at about 100. Reasons for the decline in numbers include habitat deterioration, encroachment by agricultural development, human activity, uncontrolled or illegal hunting and also anthrax.

The Transvaal Nature Conservation Division is concerned about this state of affairs and special conservation measures for this rare and endangered antelope are taken. This includes strict legal protection and efforts to establish and maintain viable herds in Provincial nature reserves. The Percy Fyfe Nature Reserve was the first area to be selected for a relocation programme. This reserve in the Northern Transvaal lies within the roan antelope's historic range of distribution. Roan antelope from the Waterberg were translocated here for the first time in 1968. During the past two years, the numbers of roan antelope have doubled in this practically disease free area.

This outstanding breeding achievement recently made the establishment of a breeding herd consisting of 12 antelope in the Nylsvley Nature Reserve possible. These animals were all examined for diseases before their release. They were also treated for internal and external parasites and vaccinated against all possible diseases. Today a healthy herd is established in this reserve. To crown this successful establishment, two calves were recently born.

Because roan antelope cannot be translocated from the Kruger National Park – for it is a foot-and-mouth disease area – this project of the Transvaal Nature Conservation Division is important. Areas outside South Africa, where the roan antelope occurs, are plagued by political unrest. It is therefore essential to have established herds of this species in their southernmost distribution area to preserve it for the future generations.

The magnificent and very rare roan antelope ◄
Photo: P. Barichievy

The animals are immobilized with an anaesthetic drug dart ▲
Photo: L. Stanton

All roan antelope are examined and vaccinated before being released ▲▲
Photo: L. Stanton

outdoor recreation in the Transvaal

J.J. Cadieux
Outdoor Recreation Research Officer, Transvaal Nature Conservation Division, Pretoria

Walking is an activity the whole family can take part in and enjoy ►
Photo: Transvaal Nature Conservation Division

Yachting is a favourite watersport in the Transvaal ►►
Photo: Transvaal Nature Conservation Division

"We regret, the Hiking trail is fully booked for the next four months."

"I am afraid, our camping grounds are full."

"Sorry, but the resort is fully booked."

These answers many South Africans often receive when making bookings for weekends or holidays. The demand for outdoor recreation opportunities has increased indeed and this fact is confirmed by the monthly reports that are received from our provincial nature reserves.

It is interesting to know that more than 70% of the Transvaal white population, lives in the Pretoria–Johannesburg–Vereeniging triangle. Major changes in our society, such as urbanisation, mobility, more leisure time and more money to spend, favours the development of new social living patterns. Exasperated by the traffic, carbon fumes, noise and hectic life in general, people sometimes like to forget about it all and unwind in nature where they can breathe fresh air.

The Transvaal Nature Conservation Division, which used to be solely concerned with the protection of fauna and flora, has not escaped from the duty to provide opportunities for outdoor recreation to the public. This was emphasised when government authorities decided, in accordance with article 69(1)(a) of the Water Act (No. 54 of 1956), to assign the development and management of the water surface and surrounding land of state dams to the provincial administrations for nature conservation and outdoor recreation purposes. Research in outdoor recreation became essential to ensure proper planning and development compatible with both nature conservation and public needs. This task was entrusted to the Outdoor Recreation Research Officer. Information on the available and demanded facilities had to be gathered and analysed. The results clearly indicated that although the public appreciate decent facilities, they prefer just the basic ones. The fact that walking is the favourite activity of people visiting nature reserves, might be the reason for this. Fishing is the activity that attracts most people at the dams. With an annual sale of more than 150 000 fishing licences in the Transvaal, the anglers have a tremendous impact on our natural resources.

The Division's concern about the fishing situation in the Province resulted in the preparation for a research project on sport fisheries in the Transvaal. The purpose of this project is to improve the quality of fishing in our waters and to provide the Outdoor Recreation Section with valuable information such as the economic impact of fishing, the pressure of angling on different waters and the favourite types of angling fish. This project to be launched in April 1978, whould be completed by December 1979. Anglers and fishermen will have to fill in questionairies and their collaboration will be appreciated.

The Transvaal Nature Conservation Division is eager to provide outdoor recreation facilities, but with respect to people, our most treasured resource, quality not quantity must be our motto.

fauna & flora

Transvaal Nature Conservation Division

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TRANSVAAL NATURE CONSERVATION DIVISION

CONTENTS:

Parrots — bright and beautiful 2
The regal caracal 6
Why conserve wetlands? 8
Modern trends in capture techniques . 10
What is happening to the bateleur? ... 12
Langjan — where the gemsbok dwells 14
Raptor rehabilitation in the Transvaal .. 16
Transvaal tortoises and terrapins 19
Cancer in wild animals 21
A special tribute 23

Cover photo:
The Caracal — one of the most handsome cat species of Southern Africa.
Photograph: Lorna Stanton

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PARROTS

Bright and beautiful

O.P.M. Prozesky,
Transvaal Museum, Pretoria.

Cape parrot

L. Stanton

M. Goetz

Brown-headed parrot

For a long time man has shown an interest in certain birds a few of which have even stirred his imagination. To name but a few: the eagle, the owl, the stork and, for the seafarer, the albatross. One of the first pets kept by man solely for his pleasure was, without any doubt, the parrot. We read about them being kept in homes during the 4th Century B.C. Not only were they kept for their beautiful plumage but also because they could imitate the human voice and thus be able to "talk". Parrots indigenous to Southern Africa are not good imitators of the human voice but are said to become very old in captivity. One hears of parrots that have lived for more than a hundred years.

Parrots belong to the Class Aves and the Order Psittaciformes, which contains only the one Family Psittacidae. This bird family contains 69 genera comprising about 350 species. At present their distribution is not world-wide. They are only found in South America, the southern tip of North America, in Africa, India and in South-east Asia. We also find them in Australia and the East Indies. South America with its 210 species is the world's parrot paradise, followed by the Australian region with 110 and Africa and India with about 30 species. Southern Africa has but a few parrots. There are only seven species of which only four are probably found in the Transvaal. Small swarms of the ring-necked parakeets, *Psittacula krameri*, have lately been observed along the North-eastern coast of Zululand. I am of the opinion that these Indian parakeets have not migrated from the North southwards, but are the offspring of escapees.

Parrots are small to medium-sized birds. They have very typical bills. The stout upper mandible, which is curved downwards, fits perfectly over the squarish lower one, which is curved slightly upwards. The upper mandible is hinged to the skull, which allows for a greater freedom of movement between the mandibles. The result is that the bill possesses more leverage to crack hard nuts and seeds which make up their chief source of food. Their bills are also used for clambering about. When stalking along a thick branch their bills are pressed down onto the branch enabling them to keep their balance so much the better. Many parrots use one of their feet as a "hand" to hold their food while eating. They possess thick, fleshy tongues which have a hard, horny tip. These tongues are well adapted to press seeds against the upper mandible while they are being deftly shelled by the sharp edges of the lower one.

Parrots have crops as well as gizzards, like all seed-eaters. Food is stored in them. It is also used to carry it to their young in their nests where it is regurgitated. Parrots probably have the most beautiful plumage of all the birds in the world. The colours of their feathers are caused either by pigments or by the structure of the cells. Most of our parrots are green or brown with a few yellow or red ornamental patches. Their protective colours make them difficult to spot while sitting in green foliage. Their flight is fast and straight with very fast, shallow wingbeats. The wings move from the horizontal position downwards. Their penetrating screams are mostly heard while they are in flight. Parrots usually nest in natural holes in trees. Barbet or woodpecker nests may also be used. Crevices in rock faces are also used. Most parrots do not line their nests. They all lay relatively small, pure white eggs: the larger species lay from four to five and the smaller ones up to eight eggs.

The Cape parrot,
Poicephalus robustus

These thickset birds are the largest parrot species found in Southern Africa. They live in the large trees of the forests and thick bush of the southern and eastern regions of our country. In the early mornings they usually fly in pairs to nearby areas to feed. They can be seen flying high overhead with rapid, almost fluttering wing-beats, continuously uttering piercing screams. Their large, conspicuous bills make them look almost top-heavy. Their food consists of yellow-wood, wild plum, and wild olive tree seeds, as well as nuts, berries and fruit. Occasionally they feed on the nectar of the Kaffirboom. They prefer drinking and bathing in shallow water. In the Transvaal I have only found this parrot at Pafuri in the Kruger National Park and in the forests at Woodbush.

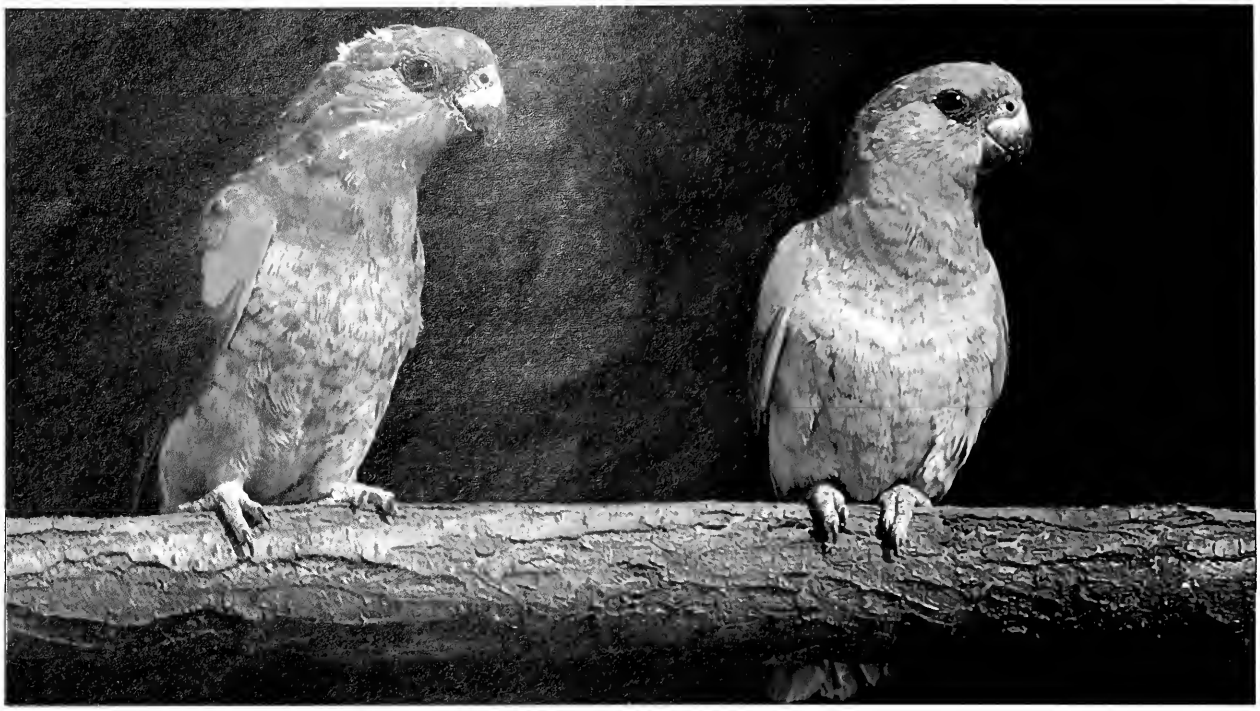
The brown-headed parrot,
Poicephalus cryptoxanthus

Very noisy and conspicuous birds seen in pairs or small groups that fly past, straight and fast, uttering shrill screeches. Their protective colouring makes them nearly invisible as they clamber about in the trees. They usually feed on seeds, fruit and berries. They have been observed feeding on the nectar of sausage-tree flowers. They are very partial to wild figs and sometimes feed on mealies and sorghum.

These parrots are mostly found in the north-eastern coastal regions of Southern Africa and are common to the Kruger National Park. They nest from May to July.

Meyer's parrot,
Poicephalus meyeri

A fairly common bird usually seen in pairs or small groups. They are widely distributed in the dry north-western bushveld ▶



L. Stanton

Meyer's parrot.

where they inhabit the larger trees along rivers and dry watercourses. They are never found far from water.

As a rule they are shy and wary. When disturbed, they dive steeply out of the tree before flying off at great speed. They usually fly low. The yellow shoulder-patches and the yellow under-wing coverts are conspicuous during flight.

They usually roost in holes in trees and feed on seeds, nuts, berries, and sometimes on cereals.

In the Transvaal these parrots are found only in the north-western regions, but do not occur in the Kruger National Park. They breed from June to December and usually nest in barbet or woodpecker nests.

Rüppel's parrot,
Poicephalus rüppellii

A relatively scarce, brown parrot found only in the northern parts of South West Africa. They are usually found in small, inconspicuous groups in large trees bordering dry river courses. They are very shy and difficult to spot but their presence is often betrayed by their shrill calls. Their food consists of insect larvae, berries, young shoots and blossoms of thorn trees. As a rule they nest in February.

The rosy-faced lovebird,
Agapornis roseicollis

These small, noisy, gregarious parrots are found in open dry country but never far from water. Their flight is fast and twisting as they weave through the trees with dexterity. When seen from the front in flight one is impressed by their red appearance. From behind their blue rumps are conspicuous. They are usually found in small flocks but after good rains gather in their hundreds to feed on grass seeds. Their food consists largely of seeds and berries, usually found on the ground.

This species breeds in colonies. When nesting in rock crevices they build neatly-constructed cup-shaped nests. The nesting material consists of short, thin sticks which are not carried in their bills. Instead, little bundles are stuck into their rump feathers and transported to the nesting-site. When they nest in social and sparrow weaver nests they do not line the nests. These small parrots are only found in the western regions of Southern Africa. They are hardly ever found in the Transvaal.

Lilian's lovebird,
Agapornis lilianae

A noisy, gregarious parrot usually found in small flocks. However, flocks consisting of more than a hundred birds have been seen. They are partial to mopaniveld but are sometimes seen in the thornveld where larger trees grow. They live mostly on the ground looking for seeds but also clamber about in tree-tops to feed on buds or seeds. Sometimes they are found in cultivated fields, far from their normal haunts, feeding on ripening crops. They have been found nesting in buffalo weaver nests. The females carry the nesting material in their bills. They are fairly widely distributed further north but in Southern Africa are only found in the northern part of Rhodesia in the Zambezi River Valley.

The black-cheeked lovebird,
Agapornis nigrigenis

This very rare lovebird has very much the same habits and ecology as the Lilian's lovebird. It is confined to a very small area of mopaniveld in the Zambezi River valley from about the Victoria Falls westwards. It feeds on seeds, fruit, berries and leaf-buds. The females also carry nesting materials in their bills.

Without doubt parrots represent the brightest and most beautiful bird species to occur in our most bright and beautiful country.

Right: Rüppel's parrot.

M. Gretz

the REGAL CARACAL

Dr. Reay N. Smithers,
Mammal Research Institute,
University of Pretoria

The caracal or lynx, *Felix caracal,* is the most powerfully built of the four smaller species of cats which occur in Southern Africa and, in the writer's opinion, one of the most handsome.

It is long in the leg, its limbs are heavily built, the paws massive and the body strong and muscular. They are able to move at great speed over short distances, have extraordinary powers of leaping and are very agile.

Their standing height is about 40-45 cm, measured at the shoulder; the adult males weight up to 17 kg and the females up to 14 kg. The short tail measures only about a quarter of the animal's overall length. The unicoloured coat is thick and soft, the colour of the upper parts varying from sandy brown to a bright reddish colour. Some animals have a slightly grizzled appearance, owing to the silvery white tips of some of the hair. The most striking feature of the species is the large, pointed ears with their long, pointed tufts of hair which may reach a length of more than half the length of the ear. These tufts stand erect and are predominantly black in colour. The claws are protractable, those on the front paws being curved and sharp and adapted for grasping prey, whereas those on the hind paws are less curved, more sectorial and adapted for cutting. In hunting the caracal is a superb stalker and will make use of the sparsest cover when approaching its prey. Having assumed an attacking stance, the animal prepares to leap and finally streaks out, just like a domestic cat, to pounce on its prey. If a bird flushes into the air the caracal will leap after it, hooking it from the air above with the front claws and, in the same movement, transfer it to its mouth. The speed of this action is quicker than the eye can properly follow and may be completed almost before the caracal has returned to the ground. While it shares this type of action with the serval, *Felis serval,* which is also a superb leaper, the caracal does not employ the serval's characteristic "hammer" action of the front limbs when dealing with small prey.

L. Stanton

The well-developed dew-claws or claws on the first digits of the front paws, are brought into play to assist the caracal in pulling down or grasping larger prey. If the prey is not killed in the first onslaught, the caracal will, in true feline fashion, make use of the dew-claws to hold the prey tightly. It will then throw itself onto its side, pulling the prey with it and then rake it with the cutting claws of the back paws. The caracal uses its canine teeth to administer the killing bite to the nape of the neck of larger prey.

All caracal are associated with open country. Where they do occur in savannah woodlands, they are found in the open spaces within, such as in vleis or grasslands. Their continental distribution shows that they are absent in true desert and equatorial forest regions, such as those situated in Zaire and West Africa. In Southern Africa this is reflected by their absence in the Namib Desert and in the much smaller areas of forest which are too small to be properly represented on the small-scale distribution map. They are not uncommon in the semi-desert scrub savannahs of Botswana and the Karoo areas of Southern Africa, both of which are low rainfall areas. They become increasingly less common in the better-watered eastern areas.

They are, however, nocturnal and secretive by nature and, like their larger relative the lion, have remarkable powers of effacing themselves by hiding in the sparcest of cover, where they will remain montionless until danger is past. The dark facial markings and the black backs of the ears, parts of which are visible from the

front, appear to act as a disruptive camouflage.

Caracal feed on mammals, birds and reptiles. They are not generally attracted to carrion. While they are quite capable of tackling small antelope up to the size of an adult duiker, analyses of their stomach contents have revealed the remains of impala, bushbuck and reedbuck. In these cases it is probable that young animals were involved. It has also been recorded that small baboons, vervet monkeys, spring hares, rock rabbits, hares and a wide range of rats and mice have been consumed. Birds which are preyed upon by the caracal include game birds up to the size of guinea fowl, doves being a particular favourite of the caracal. Stevenson-Hamilton records a tawny eagle, *Aquila rapax*, and a martial eagle, *Polemaetus bellicosus*, being preyed upon by caracal, which must be accounted unusual and, in a list of naturally selected prey, Stuart (1977) includes a Cape grey mongoose, *Herpestes pulverulentus*.

Litters numbering two to five young, are born in disused antbear holes or in other holes in the ground, in the bases of hollow trees or other substantial shelters. There is very little information on the times at which the young are born. The gestation period is approximately 64 to 68 days.

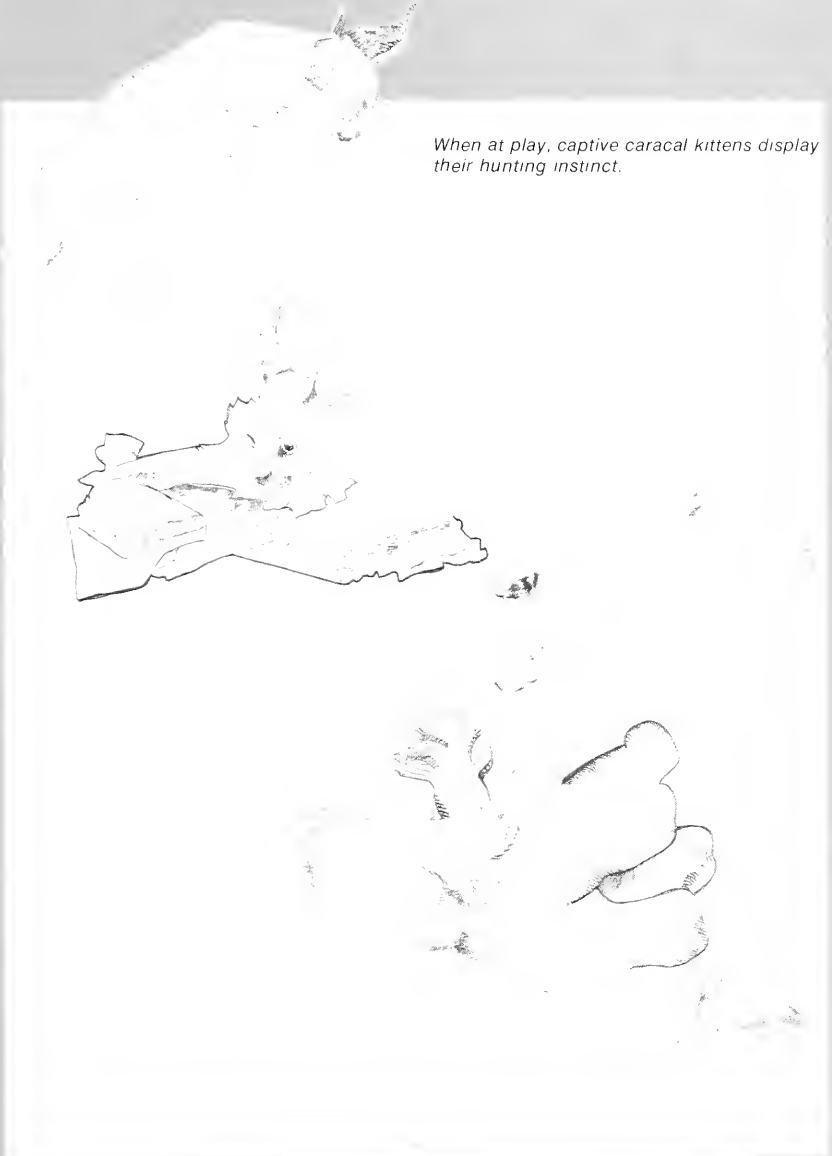
The young are born blind, their eyes opening on about the ninth or tenth day. At about ten days the black facial markings are very obvious and the black-backed ears are folded back against the head. The ears do not become erect until the thirtieth day, by which time the ear tufts are about 15 cm long.

Play in the young kitten is very obviously orientated towards practice in stalking and the capture of prey. At the age of two months this play mainly consists of: leaping or standing on the hind legs and pouncing, hiding, ambushing, crouching under cover and getting a good grip on the ground with the hind feet before rushing out to attack. All of these actions are included in the hunting behaviour.

It is unfortunate that human development in parts of their areas of distribution in Southern Africa have resulted in the caracal becoming a problem animal. The availability of their normal mammalian prey has been reduced and has been replaced by domestic stock, such as sheep or goats. In addition, control measures have greatly exterminated the black-backed jackal, *Canis mesomelas*, which is one of the caracal's rivals for food. The result is that, with a plentiful artificial food supply and a reduction in competition, the numbers of caracal have risen dramatically in some parts. Consequently the depredations on domestic stock have greatly increased. The Asian subspecies is now listed by the IUCN in the Red Data Book as being "at risk" and, while this could not be applied to the Southern African caracal at present (except possibly on a local basis), the position should be monitored from time to time. Happily they occur in a number of major national parks and reserves in Southern Africa and the future of the species, in spite of the control measures being exercised against them in parts, seems reasonably secure.

Studies on the caracal are part of a larger project on the small carnivores of Southern Africa which is supported by grants from the CSIR and the Transvaal Nature Conservation Division, to whom due acknowledgement is made.

Distribution of the caracal in Africa.



When at play, captive caracal kittens display their hunting instinct.

Why Conserve Wetlands?

Dr. Garth Batchelor,
Senior Professional Officer,
Transvaal Nature Conservation
Division, Pretoria

Wetlands, as the name implies, are areas which are seasonally covered by water. Thus the term "wetland" is a general one which includes pans, vleis, reed-beds, and the flood-plains of some rivers. These areas are considered to be of negligible agricultural value since the soil is too damp for most crops and since they harbour internal parasites which are detrimental to livestock. Because wetlands create problems for urban developers (for health and construction reasons) they are consequently drained without further thought. The most classic example of wetland abuse is in Holland where, under the guise of land reclamation, some of the finest wetlands have been destroyed Only now, for the first time, are conservationists attempting to save the last of Holland's wetlands.

But why conserve wetlands? Firstly, wetlands are essential for the replenishment of underground water supplies. The spongy soil slows down the rate of waterflow, thus absorbing the water which seeps down into it. An undisturbed vegetation cover is essential for this process to occur effectively.

Secondly, wetlands have complex ecosystems. Dependent on these ecosystems is a diversity of waterfowl, reptiles, plants and invertebrates. Owing to their dependence on these ecosystems, they are very sensitive to any imbalance or disturbance of their environment. For this reason the Transvaal Nature Conservation Division is highly concerned about the future of wetlands in the Transvaal. It has been decided, therefore, that the Division will embark on an intensive study of these habitats The primary aim of this project will be to identify these wetlands of importance to waterfowl, especially ducks and geese Since there are many types of wetland habitats, they will be classified to facilitate future research in this field

In areas where rainfall is erratic, wetlands are naturally highly dynamic systems and they are utilised in different ways by the various species of waterfowl according to prevailing climatic conditions Certain species of duck, for example, have been observed breeding in shallow, recently-flooded pans The common, yellow-billed duck often nests beside an isolated seasonal pan

It is essential for the successful preservation of bird species that their natural habitats remain undisturbed while they are breeding, since they can then be more easily attacked by their enemies which, in turn, will upset the breeding process. Breeding birds are proof that the species has been successfully preserved and prime or undisturbed habitat is of the utmost importance, as breeding birds are very prone to predation. Inferior habitat could therefore lead to a significantly reduced rate of breeding.

In the United States scientists have discovered that the basic environmental requirement for breeding ducks is a narrow strip of unploughed grassland surrounding a pan or vlei. The ducks breed in this rank vegetation and, after the eggs have hatched, the ducklings move on to the recently flooded wetland. The seasonal pans or vleis are far more important to breeding birds than are the permanent stretches of water such as lakes, since only the seasonal ones develop an exceedingly abundant variety of invertebrate fauna. This is a result of the flooding and subsequent decomposition of the vegetation which releases nutrients into the system. These invertebrates have an exceptionally high protein content which is essential for the development of the ducklings.

During a few months of each year, normally after the breeding period, ducks and geese moult all their flight feathers and are thus unable to fly. The birds then move on to larger stretches of water so as to be protected against their enemies during this moulting period. The larger stretches of water are also used as places of refuge during dry seasons when all the smaller wetlands have dried up.

There are, therefore basically two types of wetlands necessary for waterfowl: those which serve as a breeding habitat and those which offer refuge during the dry season and during the moulting period As ducks invariably breed on small, isolated pans and vleis, which are situated almost exclusively on private farmland, the future of our ducks and geese lies in the hands of our farmers

An appeal is thus made to all farmers to reconsider before ploughing seasonal plans, no matter how small these pans are and to leave a peripheral strip of natural vegetation around all pans and vleis

G Batchelor

L. Stant

Spoonbill

G. Batchelor

Green-backed heron

G. Batchelor

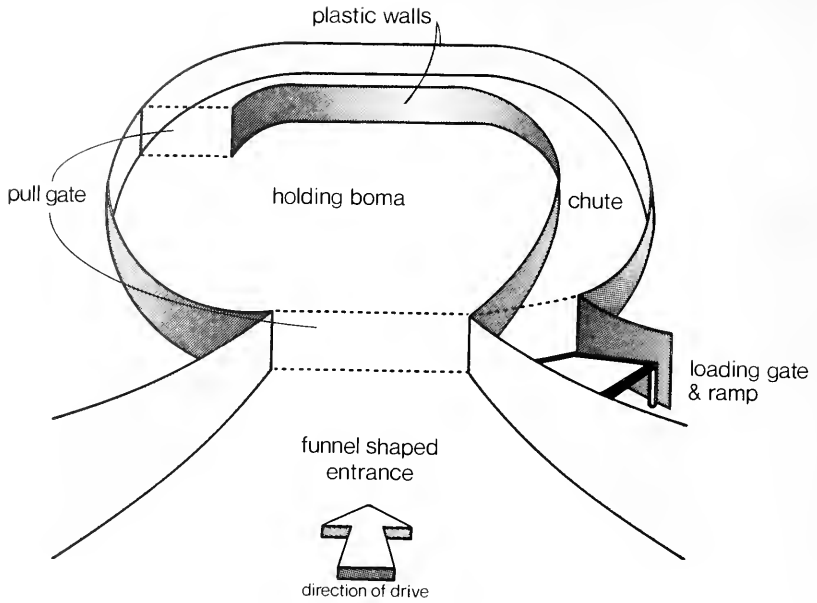
Purple gallinule

G. Batchelor

Dabchick

Modern Trends In Capture Techniques

Dr. M. Strong,
Professional Officer,
Transvaal Nature Conservation Division, Pretoria



The use of plastic capture corrals, like the one illustrated, now makes it possible to capture vast numbers of animals in one day.

Capture techniques are continuously being refined and improved to meet an ever-increasing demand for game relocation and biological research. The methods used depend largely on the species involved and might entail a combination of the two basic forms of capture, namely mechanical and chemical. Some of the more recent advances in capture methodology are summarised in this article.

One of the most practical forms of mechanical capture was one developed by Mr. J. Oelofse who utilises the well-known technique where plastic sheeting is shaped like a funnel and ends in a corral into which the animals are herded. In order to reduce the stress of herding to a minimum, a number of modifications of this technique have evolved.

The late Mr. Z.J. Young created the concept of a "capture camp". The camp, approximately 25 hectares in extent, is constructed within a bigger game reserve or farm. Instead of herding or chasing, the animals are enticed into this area by means of salt licks, newly-burnt veld or simply by encompassing the most frequently used watering point. Within this camp a funnel and corral of game fencing are made. The animals become acquainted with the funnel and corral by having free access to these permanent structures over a suitable period of time. When the animals have to be loaded, the funnel and corral are covered with plastic and the animals are gently driven into the "trap" with very little disturbance. It is an extremely useful method since the animals can be transferred to waiting vehicles at any convenient time. It has already been utilised very successfully to capture considerable numbers of impala, kudu and waterbuck.

Recently the Transvaal Nature Conservation Division applied the same basic technique by successfully enticing gemsbok into a capture corral and using lucerne as bait.

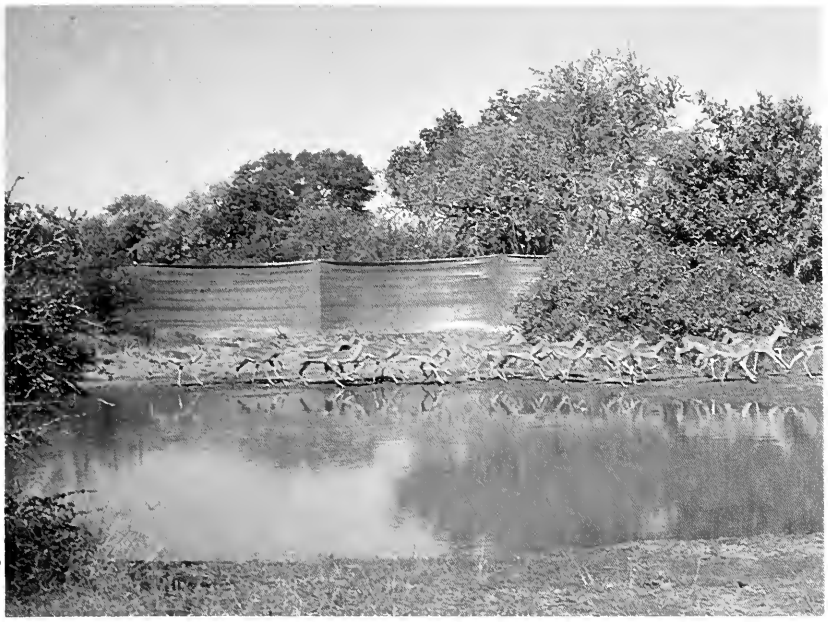
Another modification of the Oelofse funnel and corral is the one known as the RIVSCO method. This technique is named after the farms on which the method was pioneered by Mr. Giliomee of Hoedspruit in the Eastern Transvaal. It also involves the use of the plastic sheeting mentioned above but in this case the sheeting is elevated from ground level once the game is actually within the area enclosed by the plastic. The sheeting, which is camouflaged by a light covering of grass, is laid around a suitable capture site, such as a waterhole, and is attached to strategically placed poles. This hidden perimeter is rapidly raised by a system of pulleys activated by a trigger mechanism and counterbalanced with weighted, 40-gallon drums (much like the movement of theatre curtains in reverse).

The use of electronic eyes is being considered. When the animals enter the capture corral the eye becomes activated in approximately the same way that the mechanism used in elevators is activated, so that the specially-constructed gates of capture camps or corrals can be automatically closed once the animals have entered the capture unit.

Dr. A.M. Harthoorn of the Transvaal Nature Conservation Division emphasises that wild animals, which are confined to small reserves and game farms where predators are absent, are unfit since they are not used to extreme muscular stress. Dr. Harthoorn consequently devised a method by which these animals must be trained, tamed and adjusted to the tempo of this capture method. This method also incorporates the plastic funnel and corral. Only the wide end of the funnel is originally erected in the area containing the animals to be captured and is covered with plastic.

The "training" consists of gently driving the animals through the funnel. The procedure can be repeated once or twice weekly, both to familiarise the animals with the structure and hence to tame them and also to exercise or train them. The tempo of the training is markedly reduced when compared with conventional herding and is vitally important. Dr. Harthoorn's studies have demonstrated that physiological stress parameters are significantly reduced the second time the animal is driven or herded. These animals can be considered as being "fitter" and "tamer". Once the animals are used to moving through the funnel, a capture corral is erected at the far end of it and the animals are captured with minimal disturbance and exertion. The process is obviously more time-consuming but it is hoped to reduce to a minimum both absolute losses, in the form of fatalities, and partial losses, in the form of subclinical pathology.

Another development by the late Mr. Z.J. Young is the pitfall and horizontal net-capture method. A funnel is constructed along the path frequented by the game concerned. The animals consequently become acquainted with the funnel and passage-way. There are two outlets to the passage: one is open through which the game can move, the other is closed and leads to the pit. The pit is approximately one to two metres deep and about eight square metres in area. It is covered with a 15 cm mesh nylon net pegged into the ground around the pit and tied to the adjoining fence-posts. The net, in turn, is covered with grass in order



E. Young

Left: These impala were caught by surprise at their waterhole when they were suddenly surrounded by a capture corral fence.

Below: Reedbuck can be successfully captured by the sophisticated use of the primitive pitfall method.

L. Stanton

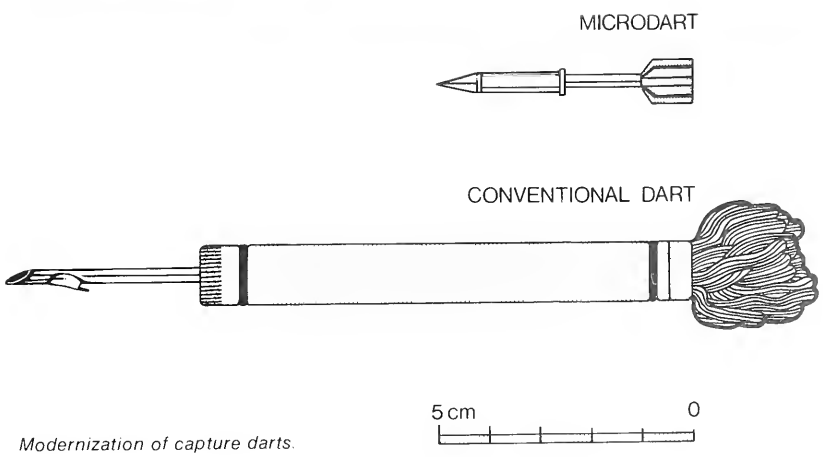
to camouflage it. When so desired, the first outlet is closed overnight and the second one leading to the pit is opened. With the assistance of spotlights the game is herded down the appropriate opening. The captured animals are suspended in the net and can be handled safely. This technique has been used successfully for the capture of a large number of reedbuck and may also be useful in the capture of other species.

In the dart-drugging field, the Transvaal Nature Conservation Division is currently involved in a feasibility study for the possible perfection and local manufacture of the microdart. The dart, for which drugs in powdered form are used, was originally developed in the United States of America. It enables the use of considerably smaller volumes of drugs and has the added advantage of a marked reduction in size and cost of the dart when compared with the conventional type for which liquids are used. Further, the improved ballistic design of the projectile should allow for more accurate darting over longer distances. It may take a considerable time before the microdart technique is finally perfected.

It must be stressed that all of those techniques require utmost skill and dedication both in their constructional and operational procedure. A hastily envisaged scheme will often not provide the desired results and many animals have needlessly been lost through an amateurish approach to a professional matter.

E. Young

Zebra in capture corral.



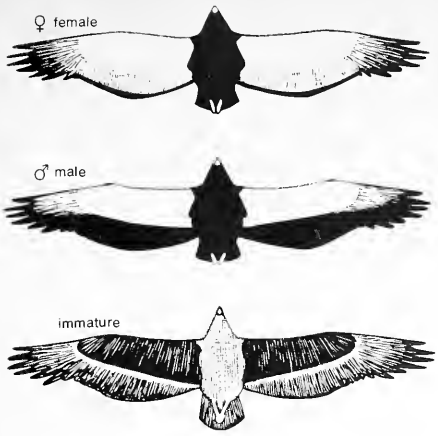
Modernization of capture darts.

What is happening to the Bateleur ?

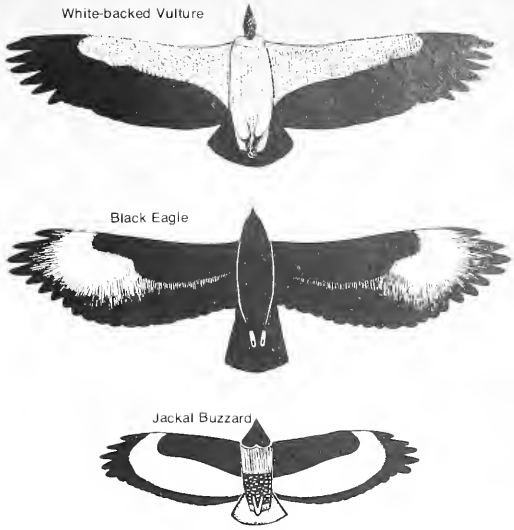
Dr. Alan Kemp,
Transvaal Museum, Pretoria

A. Kemp

P. Barichievy



Wing-patterns of the bateleur.



Wing-patterns of some raptors which can be easily confused with the bateleur.

How do bateleurs actually obtain their food? Why are they built and coloured the way they are? Why do they breed when they do, and why do they have such unique facets to their breeding biology? It now appears that these answers must urgently be sought in South Africa, for the species has suffered a considerable reduction and nowhere more markedly than in the Transvaal. An article written by Dr. Austin Roberts in *Fauna and Flora* (1956 No. 7; p. 109) indicates that by 1956 the species was no longer to be seen in the region of the Wonderboom, just north of Pretoria, although he described it as common there earlier in the century. By 1940 the species was reported as having become absent near Thabazimbi but at the same time the bateleur was sighted near Potgietersrus and this was noted with great enthusiasm since the species was thought to have disappeared there also.

Recent surveys in the Transvaal have recorded the bateleur as common only in the lesser developed areas of the eastern Lowveld. There are a few records of sightings north of the Zoutpansberg and further north the species is recorded only in close proximity to the Limpopo — these birds are possibly bateleurs hunting from the quieter areas of Botswana.

The bateleur is surely the most striking eagle to grace the skies of the Transvaal and is easy to recognise by its distinctive shape in flight. This shape remains more or less constant through all the stages of its development. During flight the wings are swept back and held up at a slight dihedral, with the wing-tips held markedly up-curved. The posterior edges of the wings are shaped like a medieval archer's bow, which together with the extremely short tail and the feet which project past it, produces a unique silhouette, unlike that of any other related species.

The exotic colours of the adult birds are spectacularly contrasted and when they are in flight this display of colour is even more dramatic. The black trailing edges of the wings serve to differentiate the sexes, since the edges are narrow and even in the female bird and broad and uneven in the male bird. Bateleur chicks are coloured entirely brown and consequently, for their own safety, they are less conspicuous than their parents.

It may nest above frequently-used roads or near human habitation, provided that it is not approached too closely. In a curious way the bateleur is very sensitive while nesting. Occasionally monkeys have been tolerated in the nest-tree. Yet, when a human-being climbs to the nest, the male often swoops low and fast over the nest with a roar of wings or it perches nearby, uttering barking calls.

The breeding time of the bateleur differs from that of other eagles: it lays its eggs during the latter half of summer, so that the chicks hatch at the beginning of winter. Individual pairs show considerable latitude in their respective laying dates. Normally it takes a long time (approximately 110 days) before a chick leaves the nest. Thereafter it also takes a long time before it becomes independent. This occurs at least seven months later. The chick may even remain with its parents after a new egg has been laid the following year, for there are records of immatures attending active nests and even assisting with incubation. However, the details of this possible co-operative breeding habit remain to be studied.

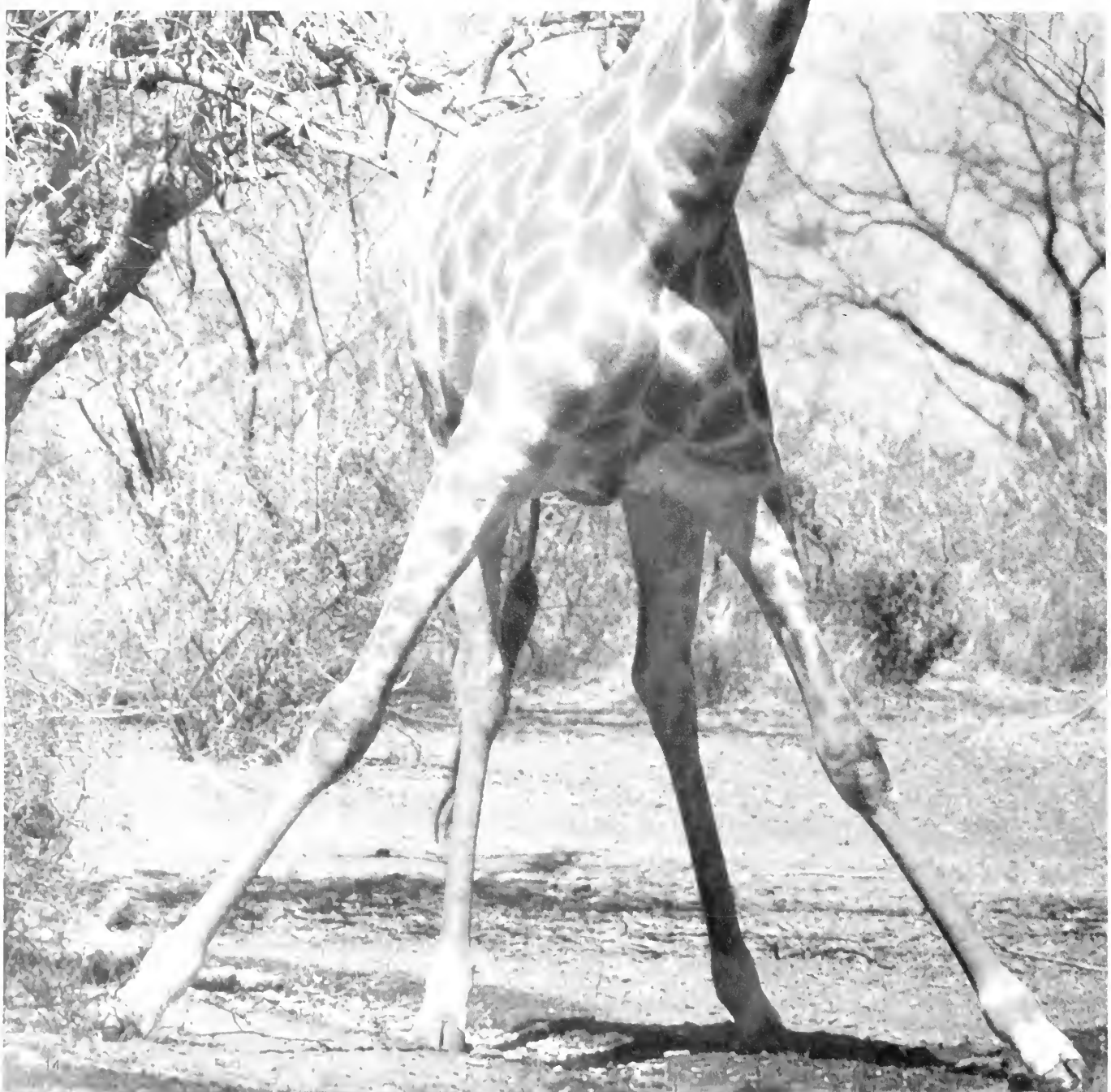
The habits and biology of the bateleur are not well known and many of its activities remain enigmatic. It can soar effortlessly over the veld at a low altitude. Its unique wing-structure enables it to glide equally well into the wind as with it, whether the day is calm or windy. Its shape is related to an excellent aerodynamic design. It rarely has to flap its wings and does so with short, sharp strokes. The bateleur feeds mainly on small carrion which it locates during its prolonged flights and can catch live birds and other vertebrates ranging from lizards and snakes to small mammals. Actual observations of prey capture by this species are, however, surprisingly rare. The bateleur is also known to feed on large carrion, often finding it first, but this habit seems to be confined mainly to immature birds. When the vultures later take over a carcass the bateleur no longer attempts to compete.

At this stage one can only speculate why the distribution of the species is shrinking within the borders of the Transvaal. Anyone who has recorded sightings of the bateleur in recent times, particularly those of actual breeding, would be of great assistance if this could be made known to the Transvaal Museum (P.O. Box 413, Pretoria). It may be possible to achieve a better understanding of the pressure to which the species is being subjected and to further attempts to save them.

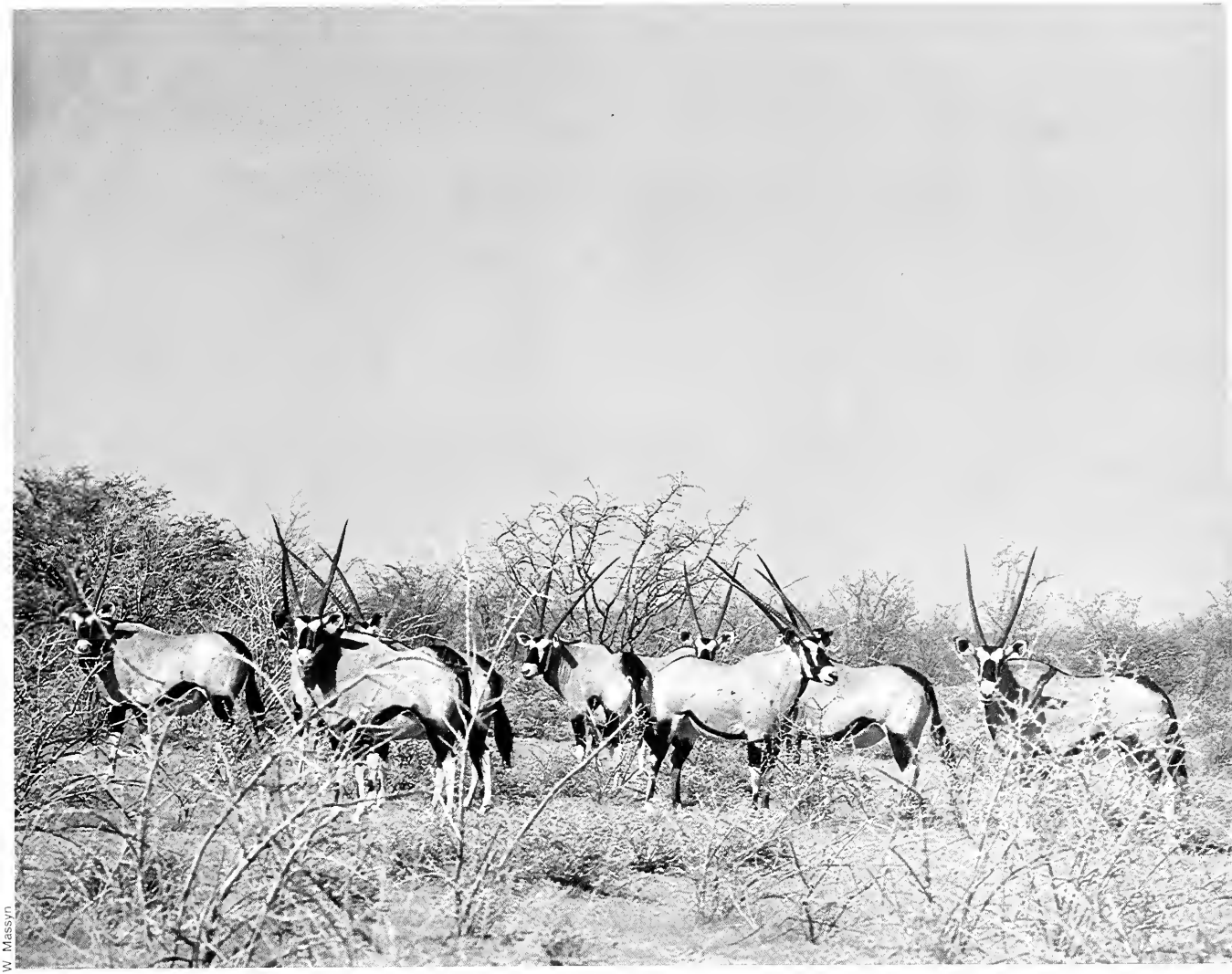
LANGJAN

Where the Gemsbok dwells

Dr. S.S. du Plessis,
Director
Transvaal Nature Conservation
Division, Pretoria



W. Massyn



W. Massyn

Langjan Nature Reserve once served an important role in saving the last gemsbok herd in the Transvaal.

In 1959 there were only 34 wild gemsbok to be found in the whole of the Transvaal. They occurred at Langjan, a farm situated in the arid, sweet bushveld of the North-western Transvaal near Vivo. Here the gemsbok were conserved as a result of the protection given to them by Mr. J.F. Engelbrecht, the owner at that time and his predecessor, Mr. W. Visser.

The farm was bought by the Administration in that year and was declared a nature reserve. Despite the fact that the farm was fenced and therefore game-proof, the gemsbok gradually decreased in number until, by September 1961, only nine bulls and one cow remained. By September 1964 they had dropped to the dangerously low level of only four animals. Over a period of approximately four years a total of 36 gemsbok were imported from South West Africa, the Kalahari and the North-western Cape. Successful breeding soon followed. In November 1970 seventy-five gemsbok were counted and in the winter of 1973, when 106 animals were present, the first gemsbok were captured for distribution to other localities.

Giraffe were established in this reserve in 1964. It is the only provincial reserve outside the Lowveld where giraffe occur. Since foot-and-mouth disease does not occur here, giraffe can be distributed to other reserves without undergoing the usual quarantine-period.

Other animals to be seen in this beautiful reserve are red hartbeest, kudu, waterbuck, impala and bushbuck. It is the only provincial reserve where the bat-eared fox occurs. Small predators are well-represented by the black-backed jackal, the caracal, the small-spotted genet, the large grey mongoose, the slender mongoose, the dwarf mongoose and the black-footed cat. Other interesting animal species are the pangolin and the python. The crested guinea-fowl has also been noted here.

Game flourishes in the dry bushveld since this area is particularly free of disease and parasites. It is, of course, ideal ostrich country. The Brak River, which flows through the reserve, offers an interesting habitat rich in bird species. There are large areas of calcareous soil which produces an excellent type of sweet grazing but which is sensitive to over-grazing. East of the river the deep, red soil produces a type of vegetation which differs completely from that found on the opposite side. It is especially suitable for browsers, such as kudu and giraffe.

Originally the reserve was only 1 500 hectares in extent which, due to the dry conditions, was too small to carry a variety of game. It was consequently expanded this year by acquiring a further 3 000 hectares. This additional land includes a large portion of the riverbank, an area comprising deep, red soil and the calcareous soil areas.

Today Langjan can function as a reserve in its own right. It will serve as a source of game for re-introduction purposes. At present it is also large enough to offer simple camping facilities and hiking trails. Thus it is possible for the people of the Transvaal to experience the charm of this "Kalahari of the Transvaal."

The Rehabilitation of Raptors in the Transvaal

Chris Nel,
Senior Professional Officer,
Transvaal Nature Conservation Division, Pretoria

As a group, the raptors (eagles, hawks, falcons and owls) are increasingly threatened on a global scale and widespread concern is expressed for the survival of many species. The threats facing raptors (destruction of habitat, pesticides, pollution and persecution) are only too well-known and conservation measures to combat these threats are being taken on an ever-increasing scale.

Each year large numbers of injured raptors are brought to the Transvaal Nature Conservation Division. These birds include road casualties, shot birds, chicks illegally taken from the nest, birds kept illegally and then confiscated and birds donated by the public, the SPCA and zoological gardens. Some of these have suffered irrecoverable injuries but, with some work and effort, many can be saved. For the past few years the Division has been actively engaged in the rehabilitation of such birds. The object of rehabilitation is to return to the wilds individuals which were formerly lost to the species. The criterion of success is whether the raptor pairs up with another and breeds successfully. As the number of birds handled (104 individuals belonging to 29 species during the period 1 July 1976 to 30 June 1977) places an enormous strain on the manpower resources of the Division, large-scale use is made of approved, dedicated volunteers and falconers who work under the guidance and control of the Division.

Since it is impractical to waste time and manpower on a hopeless case, the chance of survival for each bird is carefully evaluated as soon as it is received. Particular emphasis is placed on the physical and psychological condition of the bird.

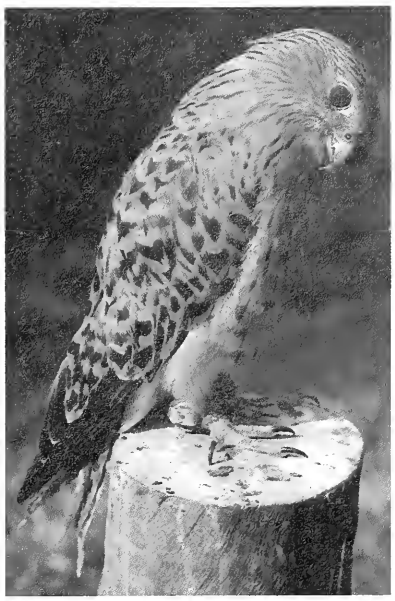
Where, for instance, the raptor has been hand-reared and has consequently de- ▶

Falconry techniques are used.

L. Stanton

Right: The first kill.

L. Stanton



L. Stanton

L. Stanton

Small raptors, such as kestrels and owls, possess strong innate hunting and prey-killing behavioural patterns.

veloped a human imprint, the chances of it being shot after release are quite good, as the bird has lost all fear of man and is too tame and trusting. Such a bird will never breed in any case and is consequently better suited for falconry purposes. Another common problem is damage to plumage. The bird may have to be kept for an extended period until broken and damaged wing feathers and tail feathers have moulted. A more serious problem is a broken limb and here a veterinary surgeon may have to be consulted for prognosis and treatment.

Once the bird is in perfect physical condition, training can commence. Falconry techniques are used throughout in the handling and training programme. The type and extent of the training programme varies in each individual case. Small raptors, such as kestrels and owls, possess strong innate hunting and prey-killing behavioural patterns even when they are young and apart from fitness training they require very little formal training. On the other hand, a large eagle, especially when obtained as a juvenile taken illegally from the nest, is as helpless as an abandoned five-year-old child in the centre of Johannesburg. These birds actually have to be trained to fly, to land, to perch on trees instead of sitting on the ground, to manoeuvre around obstacles, to hunt and to kill their prey. Since the trainer must teach the bird things that would normally have been taught by the parent and, since the trainer cannot fly and teach by being an example, training may entail several years of patient, demanding and often painful work.

When the bird is fit and regularly taking prey, it is re-introduced to an area of suitable habitat. The type and period of re-introduction is adapted to each individual case and the bird may have to be kept or flown regularly for a period of time in the release area to enable it to orientate itself in its new surroundings. Another tried and proven method is the so-called 'hacking' technique whereby food is placed daily on a 'hacking platform' for the bird, to tide it over the difficult period when it is adapting itself to an independent life.

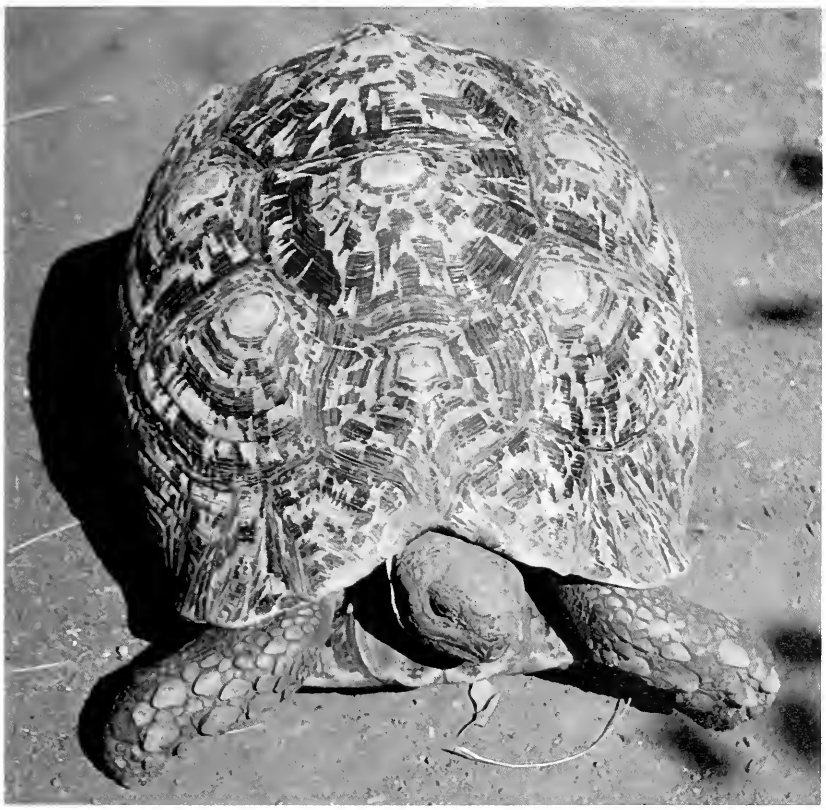
In order to evaluate the success of rehabilitation, each bird is, if possible, ringed before release. As the percentage of recovery for ringed raptors is very low, many years may pass before the results could become meaningful. Marking the birds with coloured patagial tags, for individual recognition at a distance, assists in speeding-up the follow-up work and may be used increasingly in future.

The principal aim of rehabilitation has never been to augment wild raptor populations to any appreciable degree, as more raptors are probably killed by cars in a single day in the Transvaal than can be rehabilitated in many years. However, working mostly with common species, we are developing techniques in handling, training and re-introducing raptors which can be used with great success in the future on rarer birds. A group of volunteers with an interest in and with experience in raptor rehabilitation is gradually being formed. The value of scientific information being obtained as a by-product of rehabilitation cannot be over-estimated. In this respect research projects undertaken by the Transvaal Museum and the Faculty of Veterinary Science at the University of Pretoria have especially benefitted. In addition volunteers who undertake the rehabilitation of raptors are required to submit regular reports concerning food requirements, moult, plumage changes with ageing, behaviour and vocalizations. The data are collected on a regular basis.

In the Transvaal all raptors are classified as protected game and a special permit is required to keep a raptor in captivity for rehabilitation purposes. It is unfortunately highly illegal to embark on private rehabilitation work, however well-intended, without consulting the Division. The public can perform a valuable service by handing over any illegally-kept raptors to the Division for rehabilitation or by reporting cases of raptors that are being held in illegal captivity. The Transvaal Nature Conservation Division is proud of the excellent work that is being done by the enthusiastic group of private co-workers.

Transvaal Tortoises and Terrapins

Niels Jacobsen,
Senior Professional Officer,
Transvaal Nature Conservation Division, Pretoria



L. Stanton

Leopard tortoise.

Geometric tortoise.

L. Stanton

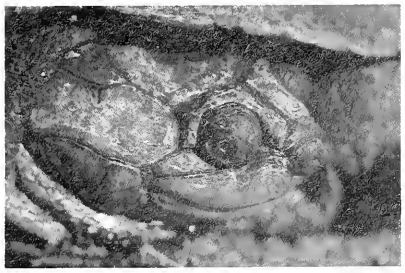
Hinged tortoise.

L. Stanton

There is an abundance of tortoise species in South Africa, particularly in the Cape Province. In the Transvaal, three tortoise and two terrapin species occur. These include the leopard tortoise, *Testudo (Geochelone) pardalis babcocki*, the Kalahari geometric tortoise, *Testudo (Psammobates) oculifera*, the hinged tortoise, *Kinixys b. belliana*, the Cape Terrapin, *Pelomedusa subrufa* and the hinged terrapin, *Pelusios sinuatus*. Apart from the various anatomical differences between these species, tortoises are normally found on dry land, whereas terrapins are usually associated with water.

The leopard tortoise and the Cape terrapin are most widespread in the Transvaal (see maps), while the hinged tortoise is mainly found in the Northern and the Eastern Transvaal. The Kalahari geometric tortoise is found in the west and northwest but a distributional tongue extends into the central Transvaal as far as Sekukuniland. The hinged terrapin, on the other hand, is restricted to the large rivers of the Northern and Eastern Transvaal and is more dependent on permanent stretches of water than the Cape terrapin, which is chiefly found in pans and other seasonal pools.

Tortoises are for the most part herbaceous, feeding on grass and a variety of plants, especially those with succulent leaves. Sometimes tortoises will feed on carrion, but this trait is more evident in the hinged tortoise than in the other two species. When feeding, tortoises bite mouthfuls of herbage with their horny, hooked beaks, swallowing whole pieces of food. Terrapins, on the other hand, are predominantly carnivorous and feed on anything they can overpower including tadpoles, frogs, fish and even ducklings which they seize and drown before eating. They are also known to feed on the remains of crocodile kills which are left in the water. Terrapins feed by biting and pushing the food away from themselves with their front feet so that pieces are ripped off and then swallowed. ▶

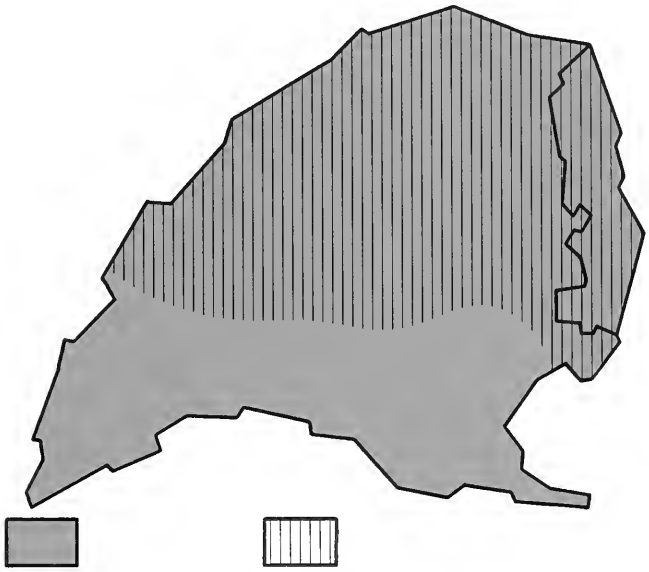


L. Stanton

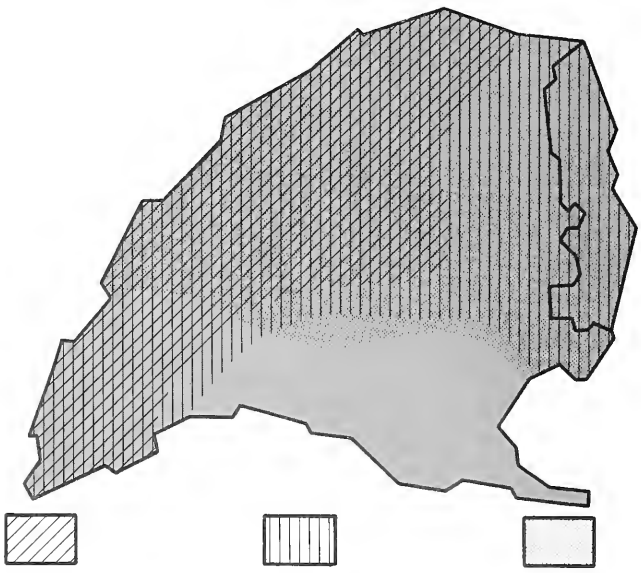
L. Stanton

The pointed snout of the Cape terrapin (left) is one of the features which distinguishes it from the hinged terrapin (right).

Distribution of the tortoises and terrapins which occur in the Transvaal.



Cape terrapin *Hinged terrapin*



Geometric tortoise *Leopard tortoise* *Hinged tortoise*

Both tortoises and terrapins are active mainly in summer. In autumn the animals search for secluded places in which to hibernate during the winter months. Such places include hollows which they scrape out under stones and logs or even in crevices between rocks. On occasions the animals partially bury themselves. Some movement may take place during winter when the animals may move to another hideout. Terrapins usually bury themselves in the soil near water. During the rainy season temporary pools may form and the Cape terrapin may be found wandering more than two kilometres across open country in search of water. It is therefore not surprising that farm dams are rapidly colonized, particularly those situated near the upper reaches of streams, as the animals frequently move upstream.

In spring the tortoises mate and egg-laying takes place in summer. Tortoise-eggs are generally hard-shelled and vary in shape from spherical to slightly oblong. The eggs of terrapins are membranaceous and oblong. The eggs are laid in holes in the ground, which the tortoises dig with their hind feet. These holes vary in depth from 12-30 cm. Between one and twelve eggs may be laid at a time, depending on the species. Terrapins also lay their eggs in holes in the ground which may first be softened by copious amounts of urine so that excavation can take place more easily. Up to 22 eggs may be laid at a time. The soil is then tamped down on top of the eggs. The eggs are subject to predation by small carnivores and ants. The hatchlings are preyed upon by a wide variety of animals and birds.

Ground hornbills are reputed to be particularly fond of young tortoises, while crocodiles feed on terrapins in spite of the noisome fluid secreted by glands situated on the inner part of the legs of the Cape terrapin. Apart from natural predators, tortoises are avidly eaten by people and were a delicacy among the Europeans in the Cape in the 19th and early 20th Centuries.

On account of the demand in the pet trade, large numbers of tortoises were exported overseas. This was not as evident in the Transvaal as in the Cape where the geometric tortoise, *Testudo (Psammobates) geometricus,* was nearly exterminated. The timely action of the Wildlife Society in obtaining an order banning the export of these tortoises from South Africa in 1950 saved them from extinction. Today these animals are protected in all the provinces. Anyone keeping tortoises in the Transvaal requires a permit from the Transvaal Nature Conservation Division. No such permit is necessary for terrapins.

CANCER in Wild Animals

E. Young

Giraffe with warts.

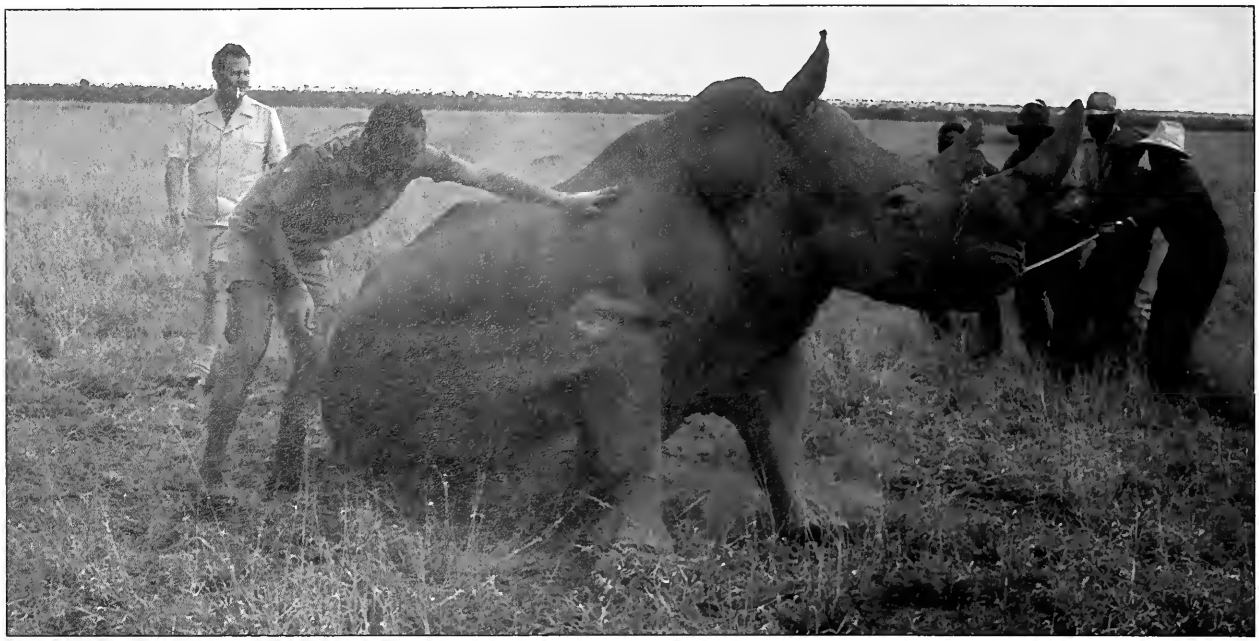
Professor R.C. Tustin,
Head: Department of Pathology,
Faculty of Veterinary Science,
University of Pretoria, Onderstepoort

Many people who have visited our game reserves may have noticed that quite a high proportion of giraffe have unsightly, somewhat horny outgrowths on the skin of their necks and may have wondered what they were. These growths are warts or papillomas which are considered to be a benign form of skin cancer and they very closely resemble those that we see in our domestic animals. The cause of these growths is unknown, but in domestic animals several types are due to virus infections which can spread to other animals by direct or indirect contact. Thus it seems reasonable to suppose that these neoplasms (or growths) in giraffes are also caused by a specific virus infection, especially if one considers how the infection spreads. Have you ever had the opportunity of watching a fight between giraffe bulls? They assume a rather solemn stance, often standing side by side, while facing in the same direction and swinging their heads and necks. This seemingly lazy action must generate considerable force, judging by the resounding thumps one hears when the adversaries strike each other. Their necks often become entwined and the infection of a wart virus could thus be easily spread by direct contact.

This example of a form of cancer occurring in wild animals is but one of many, although cancer is much less frequently encountered in wild animals than in the domestic species. There may be several reasons for this relatively low incidence but again the old adage of "the survival of the fittest" is a relevant point at issue. In other words, animals suffering from cancer are more vulnerable to predators. In this way, through the millennia, game populations which have a high resistance to cancer have been naturally selected for survival.

At this stage one may well ask what cancer is and what the causes of cancer are. To begin with, "cancer" is not a word which is favoured by scientists. They prefer to use terms such as "neoplasm" or "tumour". It is also popularly believed that cancer is one specific disease. It is, in fact, a term which embraces many different and distinct forms. A neoplasm arises basically when, for some usually obscure or vaguely understandable reason, a cell or group of cells begins to multiply continuously while the normal control mechanisms in the body are unable to prevent them from doing so. Some neoplasms may reach a tremendous size and may eventually weigh several kilograms. Some tend to remain localized at the site of origin — these are mainly benign neoplasms. The malignant variety, however, are able to infiltrate blood and lymph vessels. Small clumps of neoplastic cells can then break away and through the vessels be transported to other areas where the cells lodge and commence proliferating anew. Thus "secondary" or "metastatic" growths are formed.

While much information concerning the causes of certain neoplasms exists, it is regrettable that we do not know what the causes of most of the neoplasms in our domestic animals are. Still less is known about these causes in our wildlife, but it is interesting to speculate as to what they could be. In animals, the known causes of certain types of neoplasms may be divided basically into physical causes (such as the ultra-violet rays of the sun), chemical causes (e.g. various plant and fungal poisons) and viral infections. ▶



H Wessels

A malignant skin tumor on the shoulder of a white rhinoceros.

E Young

Similar types of cancer occur in man and animals.

It is interesting to note that at least three different South African plants have been proved capable of causing cancer when experimentally fed to animals. These are bracken fern, *Pteridium aquilinum*, various cycads, *Encephalartos spp* and some ragwort or *Senecio* species. There are possibly others of which we are unaware. Some fungi which occur in South Africa and which grow on plant material may produce poisons which are potentially potent causes of cancer. Thus it is possible that at least some of the neoplasms which are encountered in wild animals may be due to environmental factors.

In addition, there are several very interesting examples of virus infections which may induce cancer in wild animals. One is a Herpes virus infection which occurs naturally in squirrel monkeys in Central and South America. It is not responsible for any significant disease in these animals but, when it is injected into certain other monkey species, it causes a disease which resembles leukaemia or cancer of the blood. Similarly an adenovirus, originating from one of our vervet monkeys, *Cercopithecus aethiops*, produces tumours when inoculated into baby hamsters but causes no apparent disease in the monkey itself.

Some very interesting types of cancer have been encountered in our wildlife. Some captive colonies of the multimammate mouse, *Praomys natalensis*, have a very high incidence of stomach cancer. This species may prove to be of great value to medical research because of the relatively high incidence of this type of cancer in humans. Several investigators have reported the occurrence of, for example, a brain tumour and two different tumours in baboons, a tumour of the vulva of a buffalo, and teratoma in the testis of a nyala. The latter is a very rare type of cancer in animals but is nevertheless worth investigating because it consists of a variety of different tissues — in this case it contained nerve, skin, cartilagenous and glandular tissues.

Another unusual condition which is not really a true cancer, although it bears a resemblance to it, is the so-called *cornu cutaneum* or cutaneous horn. These horn-like growths have been seen in a kudu and an eland. In the latter animal it occurred on the leg and it was so large and bulky that one wonders how the animal could have escaped the attention of predators. It must have seriously hindered the locomotion and agility of the animal for a long time before it was eventually shot.

It is obvious, therefore, that nature selects and breeds the healthiest and fittest specimens, thereby ensuring a high quality of natural life.

Erratum. Fauna & Flora 28, p. 18
The photographs (uppermost and centre) of the protea, *P. rubropilosa*, were erroneously described as *P. Laetans*. The editors apologise to the author of the article, L. Davidson.

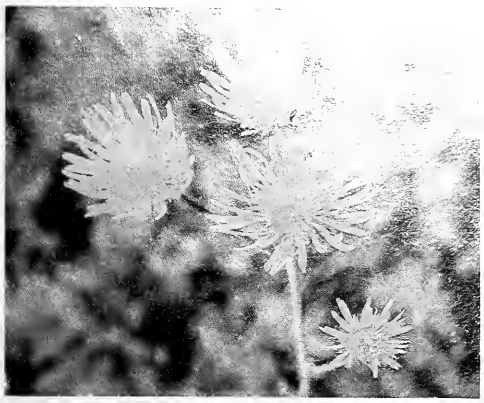
L. Stanton

Hazel Marwick.

A Special Tribute

Cecilia F. Louw,
Information Section,
Transvaal Nature Conservation Division, Pretoria

L. Stanton



L. Stanton

Nature Conservation

L. Stanton

L. Stanton

While visiting Canada, Hazel Marwick recognised certain South African plants in the famous Butchart Gardens in Victoria, British Colombia. Inspired, she returned to South Africa where she decided to leave R30 000 to the South African Nature Foundation for the conservation of rare indigenous plant species.

Hazel was born on 8 July 1916 in Swaziland. At that time her father, Allan Graham Marwick, of Swedish origin, was High Commissioner of this region. Her mother, previously a Miss Cathlene Parker, met and married Allan in 1909 when she visited South Africa to recuperate from a prolonged illness. Since then South Africa has been her home. It was Hazel Marwick's mother who nurtured and encouraged her appreciation for the fine arts. Today Hazel is in the autumn of her life. Her way of living is reflected in Keats'

"Beauty is truth, truth beauty —
That is all ye know on earth
and all ye need to know."

The Transvaal Nature Conservation Division wishes to take this opportunity to pay tribute to her for her contribution towards the protection of our colourful but threatened, indigenous flora.

L. Stanton

Cape Eagle Owl/*Bubo capensis*.

fauna & flora

Transvaal Nature Conservation Division

fauna & flora

NOVEMBER 1978 NUMBER 34

TRANSVAAL NATURE CONSERVATION DIVISION

CONTENTS:

The biggest and the best 2
Frogs of the Suikerbosrand nature reserve 4
Butterflies — a word of warning 8
Camels of the Transvaal Bushveld 10
Common poisonous spiders of the Transvaal 14
The banded mongoose — the farmer's friend 18
Green Cancer 20
Rare birds of the Transvaal Highveld .22

Front cover:
Rattling Kassina/*Kassina wealei*
Photograph: Vincent Carruthers

Back cover:
Bushveld sunset
Photograph: Lorna Stanton

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D. Wolff

African elephant.

the biggest and the best . . .!

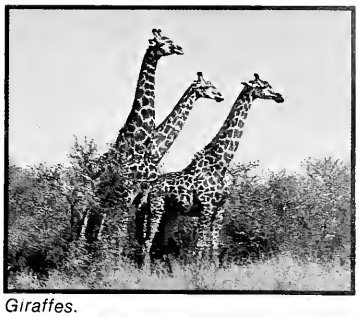
Jayne Deeks,
Assistant, Wildlife Awareness Communication Division, Wildlife Society of Southern Africa, White River

L. Stanton

African python.

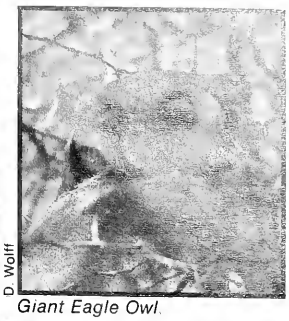
Transvaal Nature Conservation Division

Modjadji cycad.



D. Wolff

Giraffes.



D. Wolff

Giant Eagle Owl.

L. Stanton

Ostriches.

In many sectors of the natural world records are broken by Transvaal *fauna* and *flora*.

The largest living land mammal — the elephant; the biggest bird in the world that lays the biggest eggs and can run over 50 km an hour — the ostrich; the largest living floral fossil — the Modjadji cycad; and the largest snake in Africa — the python: each could lay claim to being one of the seven wonders of the natural world.

In the plant world there are several unique species which occur only within the confines of the Eastern Transvaal. A modest cousin of the flamboyant blue *Agapanthus* lily, the drooping grape *Agapanthus inapertus*, lives along the escarpment of the Eastern Transvaal Drakensberg, as does *Kniphofia galpinii* — one of the rarer members of the Red Hot Poker family. A protea of exceptional beauty and rarity, the Blyde protea, *Protea laetans*, was only recently discovered and is so far known to occur only in the Blyde River Canyon.

The rarest cycad in the world, *Encephalartos inopinus*, was at one stage known to have just one existing female plant in the entire world. This situation has been remedied by the work done by the personnel of the Transvaal Nature Conservation Division in establishing a breeding nucleus of these plants at the Hartbeeshoek Provincial Nursery.

The flying, feathered world of birds contains several unchallenged records. Nesting high up in the inaccessible krantzes of the Drakensberg is the Bald Ibis. Its largest breeding colonies are in the Transvaal and its entire distribution is limited to South African territory only.

The only known specimen of the White-Winged Fluff-tail to be recorded in over fifty years was discovered on the Suikerbosrand Nature Reserve near Heidelberg. This bird had been thought by some to be extinct, while others believed it was merely a fantasy. The discovery thus caused great excitement in the ornithological world.

The largest flying bird in the world — the Kori Bustard — like the ostrich, is found in the Transvaal. When 23 kg of bird takes off in flight, it is a sight never to be forgotten — something like watching the first jumbo jet take to the air. The Giant Eagle Owl, with a wingspan of one metre, is the largest owl in Africa, yet in the same area, the smallest owl — the Pearl Spotted Owlet — may also be found.

The mammalian order abounds with the rare and the unique. The giraffe is the tallest of all the many animals on earth, and it is in the Timbavati area in the Transvaal that the density of giraffe is highest. Hippopotami are the largest amphibious mammals in the world, and many of them herd together in the deep, still pools of the Eastern Transvaal rivers.

The South African Highveld has a number of antelope, peculiar to its flat grassy plains. The black wildebeest and blesbok are the clowns, their strange looks and nodding canter being characteristic of the Transvaal highveld. Several shy species of antelope are also found here, such as oribi, mountain reedbuck and grey rhebuck.

The shy Samango monkey is found in its highest concentrations in the thickly wooded kloofs of the Blyde River Canyon. All six South African primates are found in this paradise.

With so many beautiful and unique forms of wildlife, the Transvaal has a record to be proud of! What are *you* doing to conserve this unique diversity for the future? □

Frogs

of Suikerbosrand Nature Reserve

V.C. Carruthers,
Company Planner, Johannesburg

Bubbling kassina.

Suikerbosrand Nature Reserve is one of the few remaining areas of natural veld in South Africa. Amongst its many vleis and streams a variety of [illegible] aquatic habitats provide breeding sites for no fewer than thirty frog species. The ecology of the amphibians has received considerable research, but in a recent survey in the reserve, a number of species showed noticeable habitat preferences.

The Natal sandfrog, *Tomopterna natalensis,* is distributed throughout the non-arid parts of the Transvaal as well as in Natal and is common on Suikerbosrand. Calling males generally take up positions on mud-banks alongside streams or rivulets of surface seepage. Apart from sometimes disguising their silouettes by sitting against a blade of grass or a small stone, they remain exposed while calling. Suitable call sites are abundant, and throughout the reserve the clear, piping choruses can be heard on most summer evenings. A similar species, the tremolo sandfrog, *Tomopterna cryptotis,* also calls from exposed sandbanks, but it shuns the faster-flowing water-courses, preferring the edges of dams and rainpools. It is rare on the reserve but is widely distributed through South and Central Africa. Much of its range is in fairly arid areas where the flow of streams and rivers tends to be very erratic.

In contrast with the sandfrogs, the kassinas usually conceal themselves deeply amongst thick vegetation along the vleis. This, combined with the ventriloquistic nature of their calls, makes them extremely difficult subjects to locate and observe. Two species occur on the reserve and, like the sandfrogs, they have very different distribution patterns. The rattling kassina, *Kassina wealei,* is mainly a Natal and southern-coastal species and Suikerbosrand represents the north-western extremity of its known range. It seems to prefer the deeper waters of the vlei where it shelters in emergent sedges. The bubbling kassina, *Kassina senegalensis,* has a largely tropical distribution similar to the tremolo sandfrog. It frequently calls from dense grass some distance away from the waters edge, although calling males do move to positions amongst weeds in shallow water during the peak of the breeding season.

Three species of toads are found on the reserve. On the lower plains and in the vleis, the guttural toad, *Bufo gutturalis,* (which used to be called *Bufo regularis),* is the common species, while in the streams the raucous toad, *Bufo rangeri,* is more often found at higher altitudes. At several intermediate localities the two species have been found to hybridise. Fully-grown adult hybrids are frequently seen, but it is not known whether they are reproductively viable. The causes of this unusual intergrading between species in the wilds is not fully understood and deeper investigation will prove very interesting. A tarred road around the reserve roughly divides the localities of the two species, and this

environmental disturbance may have stimulated hybridisation.

The third species of toad is the red toad, *Bufo carens*. Males of this species call while floating in the water and they tend to select swampy pools or small dams. They occur in many parts of the Transvaal but appear to be common in some localities and absent from others. They are found only along the south-western boundary of Suikerbosrand.

In several places the ridges dominating the reserve are split by deep kloofs where clear streams tumble along under the forest canopy. Only one frog species seems to penetrate these shady retreats — the common river frog, *Rana angolensis*. As its name implies, it frequents many other riverine habitats including deep, sluggish pools and dams, which it shares with the similar-looking Cape river frog, *Rana fuscigula*. The restriction of the Cape species to the larger bodies of water is in marked contrast to its behaviour in the Cape Province; in places, such as Tsitsikama and Table Mountain it is commonly found in the densely-wooded mountain streams and kloofs.

Like most of the Highveld, two-thirds of the annual rains at Suikerbosrand fall between November and February and large areas of grassland become flooded around the perimeters of vleis and streams. The warm, shallow waters are rich in food for both tadpoles and adults and they provide ideal breeding grounds. Two species in particular have been found to utilise this inundated grassland, the puddle frog, *Phrynobatrachus natalensis*, and the dimunitive Caco, *Cacosternum boettgeri*.

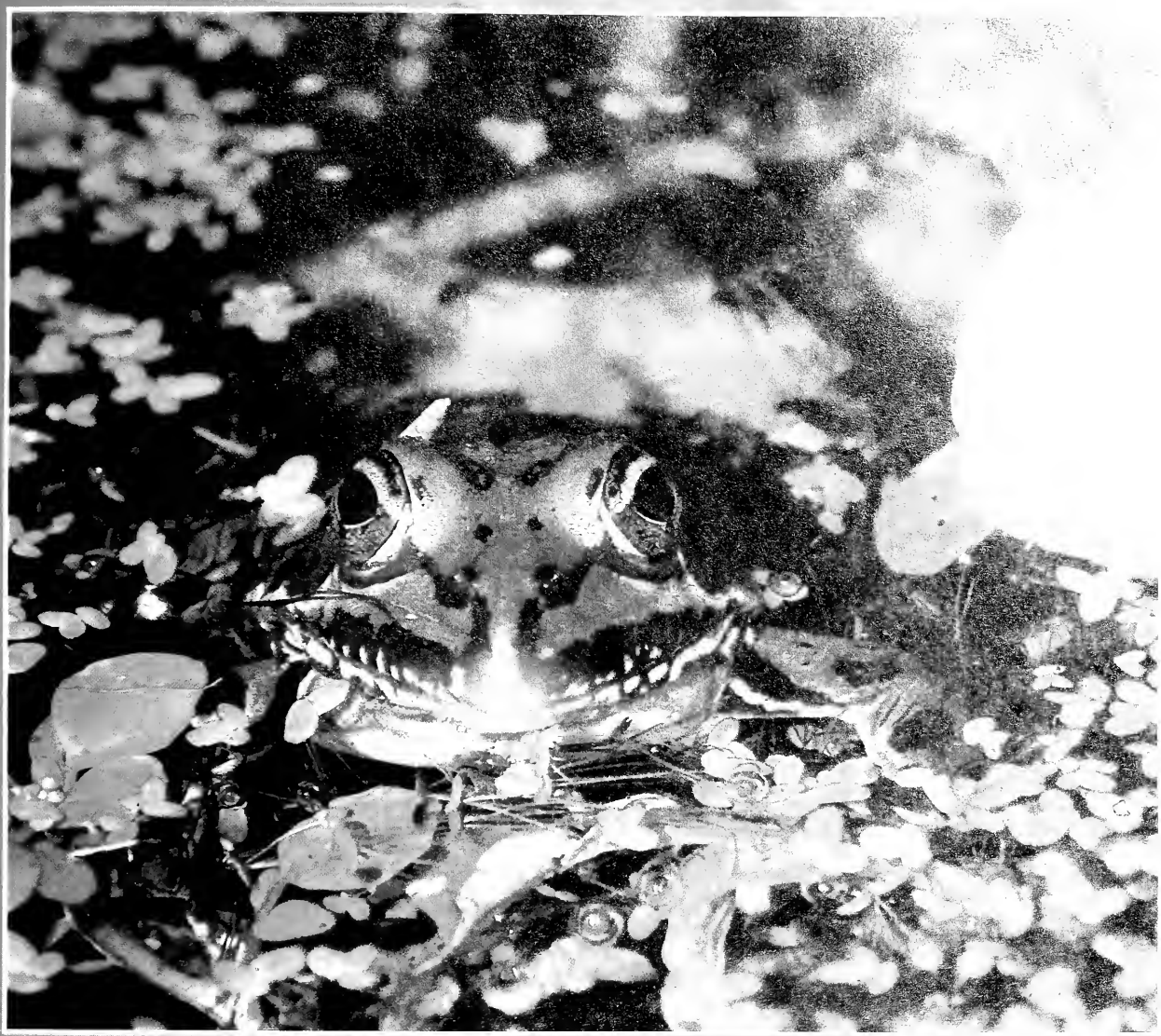
The platanna, *Xenopus laevis laevis*, also benefits from the annual flooding, but in a rather different way. Unlike other frogs, it is almost totally aquatic and it tends to be a scavenger rather than a predator. The floods enable it to leave the confines of the permanent water, and it can frequently be observed swimming about over what was previously dry veld, exploiting the plentiful supply of new food resources.

The aquatic habitats of the Highveld are fragile systems and are subject to erratic and extreme climatic influences (quite apart from the ravages of urbanisation and agriculture). The study of their utilisation by frogs suggests that moderately small differences are significant when determining their suitability as breeding grounds. Further investigations could certainly contribute to a better understanding of the biology of these natural water courses. □

V. Carruthers

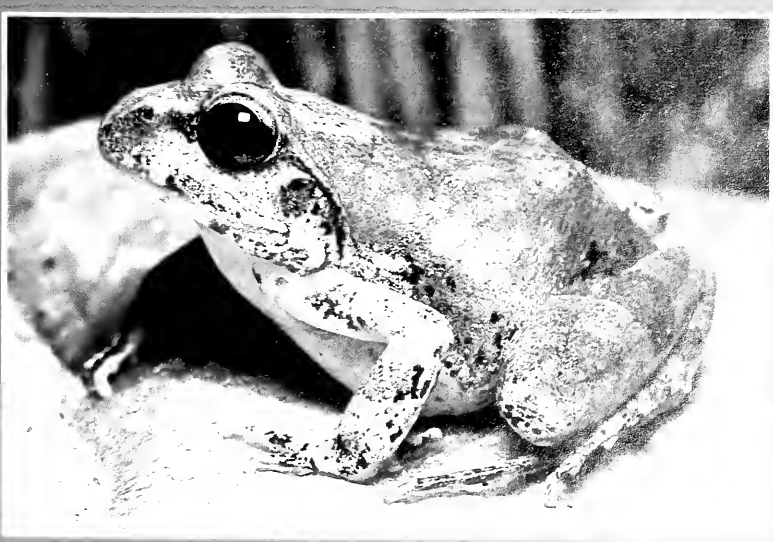
Above: a tremelo sandfrog. Below: a guttural toad calling.

V. Carruthers



V. Carruthers

Above: Cape river frog. Below: a reddish-brown variant of the Natal sand frog.



V. Carruthers

W. de Beer

Vanessa cardui.

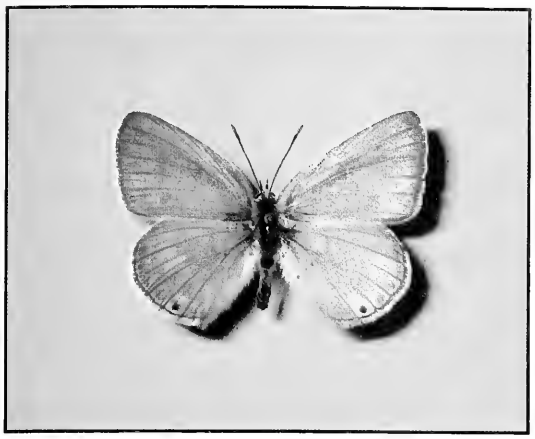
BUTTERFLIES - a word of warning

J.J. Kloppers,
Assistant Director Management,
Kruger National Park, Skukuza

As opposed to the moths, of which there are thousands of species in South Africa, the butterflies are only represented by approximately 500 species. Butterflies are the more colourful. Both have scales on the wings, which place them in the order Lepidoptera.

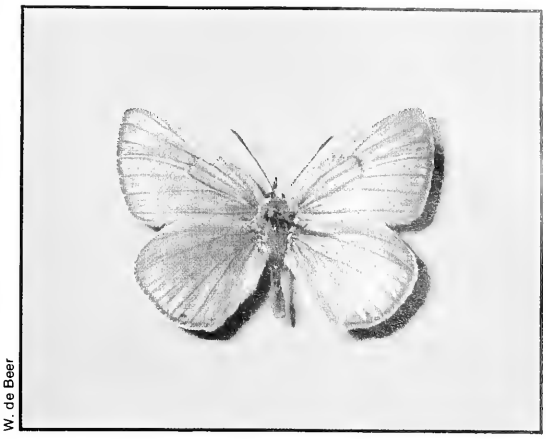
Notwithstanding accusations to the contrary, there is not one single butterfly, or its larva, which constitutes a threat to man, his possessions, or his products. Where cases of damage to crops, clothing and the like have been recorded, due to activities of commando, mopanie and other worms (to name but a few) moths are certain to be the culprits. Due to ignorance, butterflies are often blamed.

Various factors determine a butterfly's preference for a specific habitat; the most important of these being the butterfly larvae's preference for certain indigenous plants. Fortunately a large percentage of our butterflies can thrive on various plants which are distributed over a wide area. This, coupled with the fact that they are vigorous fliers and are not dependent on a specific climate, helps to ensure their survival.



W. de Beer

Lepidochrysops swanepoeli.

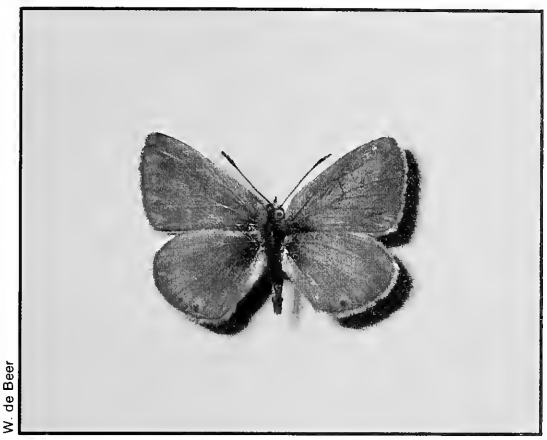


W. de Beer

Lepidochrysops irvingi.

W. de Beer

Alaena margaritacea.



W. de Beer

Lepidochrysops jefferyi.

Vanessa cardui, (Painted Lady) occuring throughout Africa, Europe, Asia and Australia, is a fine example of this group which, with the exception of, *Dixeia, Leptosia,* and a few other genera, includes most of the family Pieridae (Whites).

Most people are aware of the great butterfly migrations, where mainly Whites in their thousands move in the same direction day after day, stopping for no obstacles: be it mountain, city or water. There is no truth in the belief that these butterflies are responsible for the occurrence of commando worm and other plagues, due to these migrations.

Contrary to the above, there is a group of butterflies which, as a result of specialisation, are more local in their distribution and thus more vulnerable.

We find various degrees of specialisation in nature. A butterfly which has only one food plant, has no problems, as long as such a food plant has a wide distribution. On the other hand, should this food plant have only a local distribution, and the butterfly be a weak flier with certain specific habitat preferences, each of these additional limiting factors increases the vulnerability of such a butterfly.

Thus we find butterflies which can survive only in coastal forests, swamps, tropical rain forests, high mountains or other specialised habitats.

The family Lycaenidae (Blues and Coppers) contains examples of this group. They usually prefer the higher mountainous areas, where they occur so sparsely and so locally that some individual colonies may cover an area scarcely larger than a football field — irrespective of the fact that their food plant may have a wide distribution. This is because these butterflies are dependent upon the presence of an ant species, with which the larva is associated in its final stages. The continued existence of this group of butterflies causes the most concern today. Although the threat is not immediate, man's activities, like his numbers, are increasing at an alarming rate. Dams and roads are being constructed, cities and towns are expanding, farming activities are increasing and exotic plantations are increasingly replacing natural areas. All of these, along with other related activies, have a direct effect on the decreasing size of butterfly habitats.

Furthermore, when one adds additional limiting factors, such as bush fires, insecticides and plant-killers to the above, the picture becomes even more sombre.

What about the immediate future? The expansion of exotic plantations along the escarpment of the Transvaal Drakensberg is posing a serious threat to some rare Blues. The high grassy slopes of the southern part of these mountains represent the only habitat of *Lepidochrysops jefferyi, Lepidochrysops irvingi,* and *Lepidochrysops swanepoeli.* Further north we find another Blue, *Alaena margarit*acea, which is restricted to the Haenertsburg district.

In our country, where nature conservation has, to date, been almost synonomous with the protection of large mammals, the time has come where more attention should now be paid to the smaller things in nature. If we fail to act in time, our decendants will feel no less strongly about the extinction of these beautiful insects, than that of the bloubok and the Cape lion. □

Camels of the Transvaal Bushveld

Dr E. Young,
Assistant Director,
Research and Information,
Transvaal Nature Conservation Division,
Pretoria

Many people believe that the camel stores water in the hump on its back. This is a fallacy. The large hump on the camel's back consists mainly of fatty tissue which serves indirectly as an important source of water for this well-known desert animal. A unique chemical process enables the camel, as with many other animals, to use the stored fat as a source of energy. Water is an additional by-product, obtained from fat. Known as metabolic water, this enables the camel to survive in the desert during periods of water scarcity for weeks on end without having to drink a drop.

The Transvaal can also boast its own "camel species" . . . the impala! Although a very well-known Transvaal antelope, few people are aware of the fact that the impala is capable of doing without water in summer for literally months on end. But the impala obtains and saves water differently to the true camel.

Research in the Kruger National Park has revealed that green grass and foliage sufficiently satisfy the impala's water requirements. Green grass, which is eaten by the impala during the summer season, can have a moisture-content of as much as 70 percent.

In winter when buffalo, zebra and blue wildebeest eat predominantly dry grass (which has approximately a five percent moisture content), impala are encountered in low-lying areas beside streams and dry water courses, selectively feeding on green foliage. The latter provides sufficient moisture to enable them to do without water for as long as a week at a time — even during the driest winter months.

It is, of course, true that impala will drink water regularly when it is readily available, as is the case with any desert animal. However, when water is scarce, they are able to adapt to drought conditions in various ways.

Animals that graze on hot days and move about actively lose a great deal of moisture in the form of sweat and vapour through the skin and respiratory system. It is calculated that the impala, which has more than 1 000 sweat glands per square centimetre of skin surface, can excrete as much as 94 ml of sweat per square metre of skin surface per hour. On a hot day a sheep excretes more than 75 percent of ▷

Impala occupy very small home-ranges. Although they are usually found near water, they seldom utilize it.

L. Stanton

the moisture required to keep it cool, through its respiratory system. This unnecessary loss of body moisture does not occur to the same extent in the impala, since it moves about during the cooler parts of the day and seeks to stand or lie in the shade of trees during the hotter hours.

A further interesting observation that was made is that impala are able to obtain substantial amounts of water by licking dew from the leaves of trees in the early morning. After an unexpected winter shower they may also spend hours licking up raindrops from rocks and plants. A considerable amount of moisture is also gained by licking themselves. In this way they are able to obtain sufficient moisture to do without water for days afterwards.

A very interesting water-storage process takes place in the rectum or large intestine of the impala. When there is plenty of water, the droppings of the impala are relatively moist. In winter, or during a spell of drought, considerable amounts of moisture are reabsorbed through the impala's large intestine, for re-use by the animal. As a result impala droppings are about 26 percent drier in the winter than they are during the summer. The impala's urine, which is more concentrated, is also excreted at longer intervals when drought conditions prevail.

Even when the impala cannot obtain sufficient moisture from its food, its daily water requirements are still low, its intake being approximately 1,4 ℓ per day.

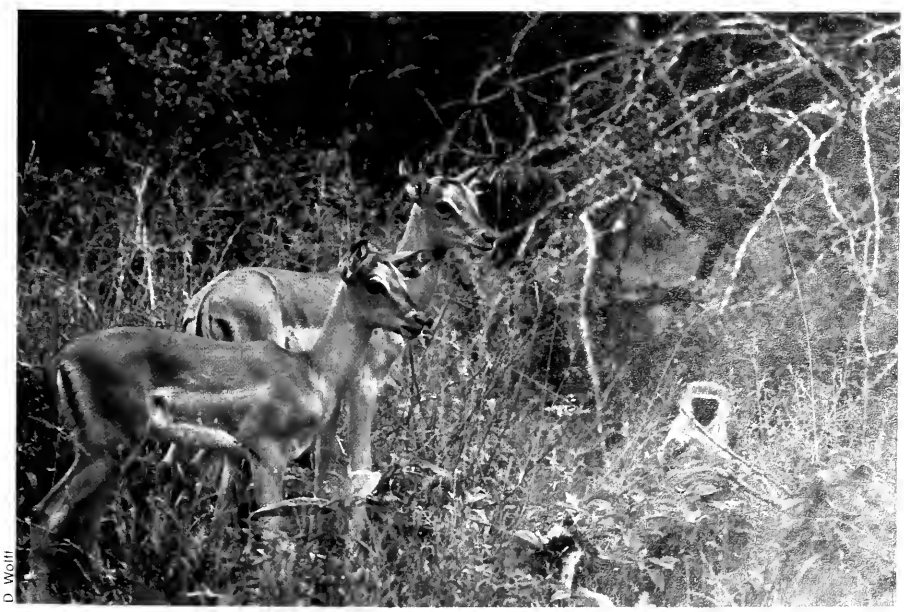
The impala not only uses water economically but also eats what would otherwise be considered worthless and even superfluous plant-matter. Herbs and other pioneer plants around water-holes are readily eaten by impala and certain plants, which may be poisonous to cattle, are eaten without ill-effect. Large amounts of leaves and twigs are taken, and in this way the impala plays an important role in naturally controlling bush encroachment. Since this beautiful antelope's diet consists mainly of foliage, especially during certain times of the year, it is a useful game animal to keep together with cattle in the bushveld areas. Not only will it serve the farmer as an additional and useful source of income but it adds to the unique natural beauty of our bushveld. □

D. Wolff

Even when water is freely available, impala usually only drink small quantities at a time.

Transvaal Nature Conservation Division

The impala's role in natural bush control and its ability to live on limited amounts of water, makes this beautiful antelope a valuable farm animal in areas of suitable habitat.



D. Wolff

Most animal species obtain considerable quantities of moisture from their food. Wild fruits supply animals (like the vervet monkey) with water, while green succulent grass enable the impala to go without drinking water for indefinite periods.

G. Newlands

Above: a black widow feeding on its prey. Right: a brown widow in its unique web.

common POISONOUS SPIDERS of the Transvaal

Mr. G. Newlands,
Department of Medical Entolomogy,
South African Institute
for Medical Research,
Johannesburg

"Little Miss Muffet sat on a tuffet eating her curds and whey. There came a big spider and sat down beside her and frightened Miss Muffet away . . ."

It is easy to understand the layman's fear of large spiders but there is little or no medical evidence to substantiate this attitude where spiders of the Transvaal are concerned. A bite by a large baboon spider will usually cause no more discomfort than a persistent burning pain for an hour or less, but bites inflicted by several of the smaller species are often more serious.

The black widow, *Latrodectus mactans*, is certainly the most infamous of all spiders. In Southern Africa both the black widow and the brown widow are widespread, the latter being much less poisonous than the former. However, the South African brown widow, *Latrodectus geometricus*, so closely resembles the American black widow, that many who try to identify specimens they encounter with the aid of an American encyclopaedia or text book, arrive at an incorrect conclusion. It is probably for this reason that much confusion still exists regarding the identity of button spiders in Southern Africa.

The black widow spider or button spider is rather small and velvet-black in colour. Females have a total body length of up to 15 mm, excluding the legs. By contrast the males of this species are about 3 mm long and are rarely seen. The upperside of the abdomen bears a red marking in the form of a stripe or stripes which are particularly prominent in immature specimens. With each moult, the intensity of colour and the length of these markings is reduced until it becomes a barely discernable dull red dot just above the spinnerets. Occasionally yellow markings are present, but the "hour-glass" marking on the under surface of the abdomen, characteristic of American forms, is absent in African specimens. The legs of this spider are uniformly black.

The web of the black widow spider is made of extremely strong silk but is untidy and without obvious pattern. From prey remains in webs it appears that large to medium-sized ground-dwelling beetles are the most common food items. The author has one remarkable record of a 10 g blue-waxbill ensnared in the web of a black widow and allegedly killed by the spider. It is commonly but incorrectly believed that this spider is restricted to the south-western Cape, but as it is found in warm

G. Newlands

climates throughout the world between latitudes 50°N and 50°S, it is very common in the Transvaal. It has been found in Pretoria and Johannesburg, that the black widow is far more common in the peripheral areas of lower housing density, than in the city centres. This is apparently due to habitat preference, as webs are made between or under rocks and amongst grass and occasionally in the corners of outbuildings. Eggsacs found in the nest of the female are about 10 mm in diameter, whitish in colour and of smooth silken texture.

When harassed, the black widow can eject a whitish and very sticky substance from its spinnerets. The function of this behaviour is probably to trap an adversary. The spiders also sham death when molested.

It is difficult to generalise on the symptoms which people develop after being bitten by a black widow, as the amount of injected venom, the site of the bite and the degree of sensitivity of the victim may vary considerably. Usually severe cramp-like pains are felt in the legs, arms, chest and abdomen soon after the bite. The abdominal muscles tense and the patient perspires and feels nauseous. Death may be caused by respiratory failure but it must be stressed that this seldom occurs, even in untreated cases. Less than five percent of untreated cases end fatally — small children or elderly persons in poor health are the most susceptable to the effects of the posion. An antivenom is available from the South African Institute for Medical Research for the specific treatment of serious cases of widow spider bites but should be administered only by a suitably qualified person.

The brown widow or gutter spider, is prone to considerable colour variation, being black, brown, grey and mottled. The under surface of the abdomen always bears the orange or red "hour-glass" marking. The legs are usually noticeably banded, being darker in the region of the joints. The body of the female may reach 12 mm in length but the male, as in the case of the black widow, is a mere 3 mm long. These spiders are common in large cities, often found in houses, beneath window-sills, in cracks, gutters and any other niche that affords suitable shelter.

The disorderly web of the brown widow spider always contains a neatly-built closely-spun silk refuge which has one entrance. The eggsacs, which are constructed within this retreat, are smaller than those of the black widow and are cream-coloured and tufted. Virtually any creature which becomes entangled in the web is preyed upon and consequently most of the prey are insects. In two cases small snakes, a Cape wolf snake and a centipede eater, were found entangled and dead in the webs of these spiders.

When molested, the brown widow may also eject a sticky fluid, but this does not occur as readily as in the case of the black widow. The symptoms which people develop after a brown widow bite are not as severe as those of the black widow, but on very rare occasions have been severe enough to warrant treatment with antivenom.

A common South African species the violin or fiddle-back spider, *Loxosceles spinulosa*, occurs in savannah habitats. These spiders are small with a body length of about 9 mm, have delicate long thin legs and only six eyes (most spiders have eight). The spider's back or carapace bears a black violin-shaped marking, which is not always obvious in old speci- ▷

G Newlands

Fierce-looking but harmless to humans – the wolf spider.

G Newlands

mens. The body colour is brownish or orange and has a dark chevron pattern on the abdomen. Males are slightly smaller than females but have longer legs. Little or no web is made and under ideal conditions, eggsacs are buried in the soil or otherwise attached to a suitable surface.

Fiddle-back spiders are nocturnal and widely distributed through Southern Africa where they usually occur in shaded areas in the veld beneath rocks, under rubble in the grass and under the bark of trees. When the cover which they use is disturbed, the spiders usually remain motionless on the ground and are often unnoticed because of their cryptic colouration. This spider occasionally enters houses and is found in cracks, under furnishings and in dark places, such as cupboards.

Fiddle-back spiders have only recently become recognised as dangerous because bites on humans often go unnoticed. Pain resulting from a bite sets in some hours later when the venom starts to destroy the tissue around the bite. This destruction, known scientifically as *loxoscelism*, results in an ulcerating wound which may take months to heal. As there is no specific antivenom currently available,

G. Newlands

The poisonous sac spider, ***Chiracanthium lawrencei,*** *on a leaf.*

no really effective treatment is possible.

Sac spiders are pale yellow in colour, have large mouth-parts and are members of the genus, *Chiracanthium*. These spiders are small, fast-moving and free-roaming and are well adapted to living in human homes where they find numerous dark corners to construct their paper-like flat oval sacs. These sacs are often seen in the corners and crevices of door jambs, in window frames, key-holes and locks and are used by the spiders as a refuge in daylight hours. At night sac spiders emerge from their retreats and wander off in search of food and mates. In so doing they often stray into the beds of sleeping people. These spiders bite very readily if disturbed but fortunately the symptoms which develop from being bitten are far less severe than those of the fiddle-back spiders. A slightly swollen spot of dead tissue develops at the site of the bite but heals within a week or two, provided that secondary infection does not occur.

Several other species are suspected of being poisonous enough to be of medical importance, but the evidence for this is often circumstantial. Few people think of capturing a spider which has bitten them, or fail to associate the spider with the bite since no pain is experienced at the time. As a result, positive identification of a spider which has inflicted a noxious bite is often difficult. □

the Banded mongoose-
the farmer's friend . . .

Niels Jacobsen,
Senior Professional Officer,
Transvaal Nature Conservation Division,
Pretoria

L. Stanton

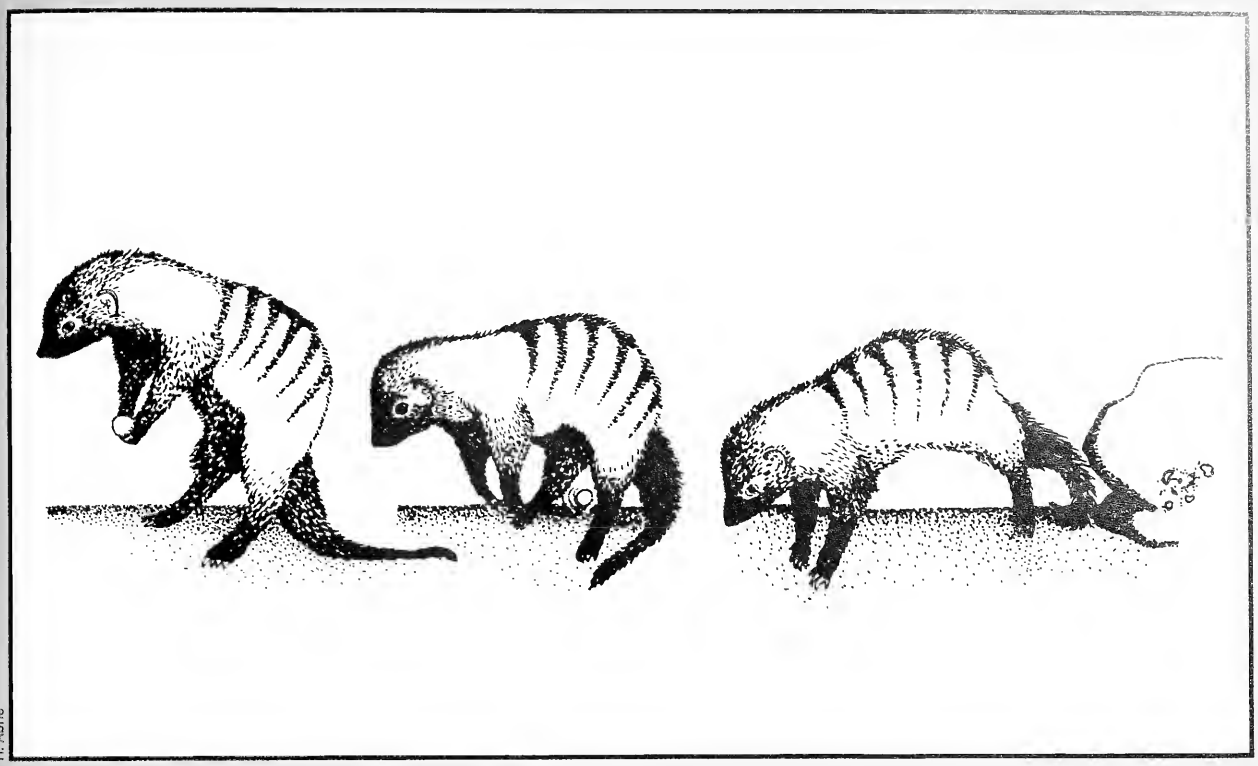
The banded mongoose.

The banded mongoose, *Mungos mungo,* occurs in the bushveld areas of the Transvaal and northern Natal, and as far south along the east coast as Port Shepstone. It is commonly called the commando mongoose because of its habit of living in troops numbering 10 to 30 individuals. In the Wankie National Park in Rhodesia troops comprising as many as 50 individuals have been noted.

The banded mongoose is therefore a social animal and individuals remain in close contact while foraging. If one or two animals are left behind as the troop moves on, they become very distressed and run about, uttering high-pitched whistles in an effort to locate the rest of the troop. Normally they tend to avoid people but, when separated from the troop, they are very vunerable and can be easily approached.

When foraging, these animals spread out in the veld and diligently search for food, which is primarily discovered by scent. They have a highly-developed sense of smell and constantly sniff under logs, stones, cow-dung and in holes in the ground. Frequently prey is located in the soil or under grass tufts and, digging rapidly, they are capable of finding food as deep as 30 cm or more underground. Digging is accomplished by the rapid movements of the front paws which are armed with long claws. In order to obtain an item of food, they frequently lie on their bellies with one paw as far down a hole as they are able to reach.

The banded mongoose is an omnivorous animal. It feeds on prey which it can overpower. Food consists mainly of insects



H. Abrie

Hard-shelled food items (such as eggs) are opened by smashing them against rocks or other solid objects as illustrated above.

and their larvae, but mice, lizards, snakes, the eggs of birds and reptiles and their young, are all eaten with relish.

They are interesting animals to watch when feeding, since each victim evokes a unique ritual. For instance when a frog is discovered it may be eaten either directly or, if it is a species which has a foul-tasting secretion on its skin, it is first rubbed vigorously on the ground by the rapid movements of the front paws in order to remove the secretion. The mongoose pauses every now and then to give the frog an experimental bite in order to see whether it has become edible.

Birds' eggs, large snails and millipedes are first nosed about and then picked up between the front paws and thrown backwards, through the widespread hindlegs, against a solid object which breaks the shell, spills the contents and the food is then consumed. This practice pertains especially to large eggs, although an adult mongoose is capable of biting a hole in an egg if the latter is held firmly between the fore paws.

Snakes do not form a large part of their diet although they are generally considered to be snake-killers. No doubt they do contribute towards the control of the snake population in that they consume the eggs as well as the young whenever they find them. However, larger snakes are not easily attacked and, it is only when the mongooses are in a group, that this is done. Their line of attack is to advance closely upon the victim and, frequently, to surround it. One of them will then bite the tail. The retaliatory strike of the snake exposes it body, consequently presenting the opportunity for another member of the troop to leap in quickly, bite and withdraw — all in a matter of seconds! Exhausted by this clever method of debilitating terrorism, the snake is quickly incapacitated and the tug o' war between the more dominant members of the troop commences. At times the enjoyment of this feast can be the prerogative of the leader of the troop who leaves the scraps to the individual who is next in line to enjoy this privilege. In this way each mongoose is able to get some food, depending on the size of the snake.

Other prey, such as rodents and the young of birds are killed by biting the head or neck directly. The prey is virtually turned inside out, since the mongoose removes the entrails, bones and flesh. The skin is not eaten and is discarded.

When foraging for food these inquisitive animals are capable of covering over 10 km per day, moving about slowly and coursing the ground. After spending some time in one area, they will move on at a swinging trot, covering ground rapidly, towards fresh feeding grounds. This trot can be maintained for long periods at a time. The animals band together and virtually follow the leader, who may be the dominant individual in the group.

They get the farmer's goodwill wherever they roam because they do not attack poultry, nor do they play a significant role in the spread of rabies. In the farmer's unending pest-control campaign, the banded mongoose's love of insects has led him to become the farmer's most dependable little assistant. □

GREEN CANCER

S.P. Fourie,
Senior Professional Officer,
Plant Research,
Transvaal Nature Conservation Division,
Lydenburg

It came from England, from Australia and from the American continent. It came from Europe and South America — it came to stay!

It found the climate and habitat so ideally suited for its needs that it flourished. Slowly but surely its numbers increased, unrestricted, since it left its natural enemies behind. It spreads like a cancer — slowly, silently, deadly.

Little did our forefathers know that those seeds and seedlings which they had imported and propagated with such good intentions, would result in a threat so serious that thousands of hectares of natural vegetation would be destroyed annually and hundreds of plant species threatened with extinction.

The green cancer, alien vegetation, has successfully encroached an area of more than five percent of the Transvaal's total surface area. This may seem insignificant but if it is considered that more than thirty percent of the Transvaal's listed rare and endangered plant species struggle to survive in the same area, then it is a matter of great concern to the various conservation bodies.

Monoculture plantations of pines *(Pinus patula, P. pinaster,* etc.), *Eucalyptus* species *(Eucalyptus grandis,* etc.) and black wattles, *Acacia mollisima*, cover an area of roughly two percent of the Transvaal and can be considered the most important threat to our indigenous plants. These plantations actively replace natural vegetation, and if not controlled, will penetrate and destroy the few remaining indigenous forests which share the same habitat.

Encephalartos species, or cycads, are probably the best-known plants known to have suffered through encroachment of alien vegetation. A tremendous effort has been made by the Transvaal Nature Conservation Division and the Forestry Department to save these living fossils from extinction, but what about the hundreds of other species — the gladioli, the watsonias, orchids, ericas, proteas, arum lilies and hairbells, just to mention a few, that might have suffered even more?

The lesser-known exotics, such as Opuntias *(Opuntia aurantiaca, O. magacantha), Solanum* species *(Solanum auriculatum, S. mauritianum), Lantana* species *(Lantana camara)* and the American bramble *(Rubus cuncifolium)* have penetrated large areas of the Transvaal, but to what extent these species have destroyed or influenced natural vegetation is not known and can only be estimated.

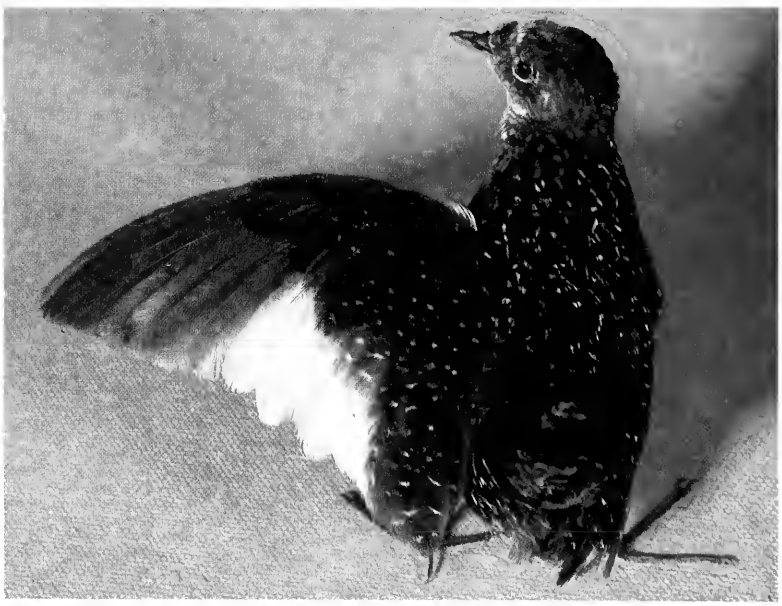
Taking all facts into consideration it is obvious that a solution to the problem of alien vegetation must be found. It will not be easy, since pines and eucalyptus are economically important species. However, there is (at the moment) no other alternative than to tolerate these species, and to eradicate them completely in some areas where natural vegetation is an asset, and the encroaching "cancer" a liability. □

S. Fourie

L. Stanton

rare birds
OF THE TRANSVAAL HIGHVELD

W.R.J. Dean,
Senior Nature Conservation Officer,
Transvaal Nature Conservation Division,
Tzaneen

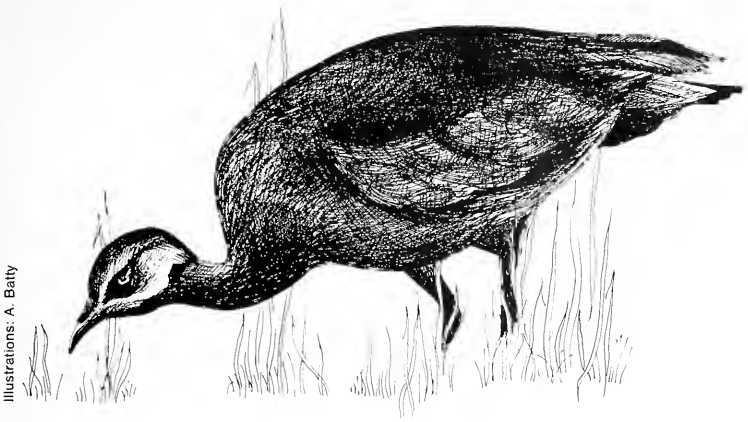


Transvaal Nature Conservation Division

White-winged Flufftail.

The grassland of the central South African plateau, known as the Highveld, is one of the most threatened habitat types in the southern part of Africa. It follows that, where habitat is decreasing or being altered in species composition, there will also be changes in the structure and relative abundance of animal communities dependent on the habitat. This is noticeable in several of the bird species which occur in the highveld grassland. While some species, notably the Blue Korhaan, *Eupodotis caerulescens*, and the Wattled Crane, *Bugeranus carunculatus*, are reducing in numbers on the highveld, other species, such as the Laughing Dove, *Streptopelia senegalensis*, the Masked Weaver, *Ploceus velatus*, and the Red Bishop Bird, *Euplectes orix*, appear to be increasing in numbers. This may be due to the superabundance of food provided for them by grain crops and accompanying grain spillage along roads and at silos during harvest-times.

Five endemic South African bird species occur in the highveld grassland of the south-central Transvaal. These are the Bald Ibis, *Geronticus calvus*, Botha's Lark, *Botha fringillaris*, Rudd's Lark, *Heteromirafra ruddi*, and the Yellow-breasted Pipit, *Anthus chloris*. All these species are listed as 'threatened' by Siegfried and co-workers and as 'rare' by the Working Group for Threatened Animals. To these five species may be added two rare birds, the Wattled Crane and the White-winged Fluff-tail, *Sarothrura ayresi*, both of which also occur outside of the Republic of South Africa. The Wattled Crane is considered as threatened in other parts of its African range and the White-winged Flufftail is very rare, known only in South Africa and Ethiopia. Both these species, together with the Bald Ibis, Blue Korhaan and Botha's Lark are threatened by agricultural



Illustrations: A. Batty

Blue Korhaan.

Rudd's Lark.

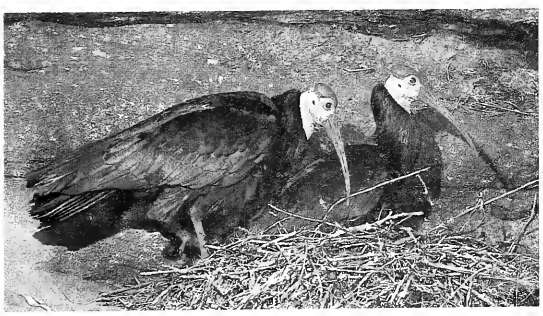
pressures. Siegfried and his fellow-researchers have suggested that seasonally-flooded pans on the highveld are being destroyed by overgrazing, siltation, cultivation and a general drop in the water table. Wattled Cranes, White-winged Fluff-tails and, to a lesser extent, Bald Ibises are dependent on such pans either as breeding or feeding habitat, and the loss of such pans cannot help but reduce dependent bird populations. The Blue Korhaan and Botha's Lark occur mainly in the higher rainfall areas of the highveld — areas in which agricultural pressure is high.

Both species feed and breed alongside croplands, though not, in my personal experience, actually in the croplands. Rudd's Lark and the Yellow-breasted Pipit occur locally on grassland in the mountainous areas of the southern highveld.

All the bird species mentioned here are worthy of detailed studies. The Bald Ibis is currently being studied by the personnel of the Transvaal Nature Conservation Division but the remaining species, with the possible exception of the Wattled Crane, are poorly known. □

Botha's Lark.

Wattled Crane.



Bald Ibis.

Erratum: Fauna & Flora 33, p. 19
The photograph (bottom, left) captioned, *Geometric tortoise,* should have been captioned, *Kalahari geometric tortoise.*

L. Stanton

A baobab tree silouetted against a bushveld sunset.

fauna & flora -35

Transvaal Nature Conservation Division

fauna & flora

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TRANSVAAL NATURE CONSERVATION DIVISION

CONTENTS:

On the spoor of the big ones 2
Diploma in nature conservation 4
The rarest tree in South Africa? 7
Aardvarks, hedgehogs and porcupines 8
The Bald Ibis 12
The hippo — living submarine 14
Foot-and-mouth disease 16
The bat-eared fox 18
Proteas of the Transvaal 20

Front cover:
Warthog
Photograph: Lorna Stanton

Back cover:
Crowned Crane
Photograph: Lorna Stanton

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L. Stanton

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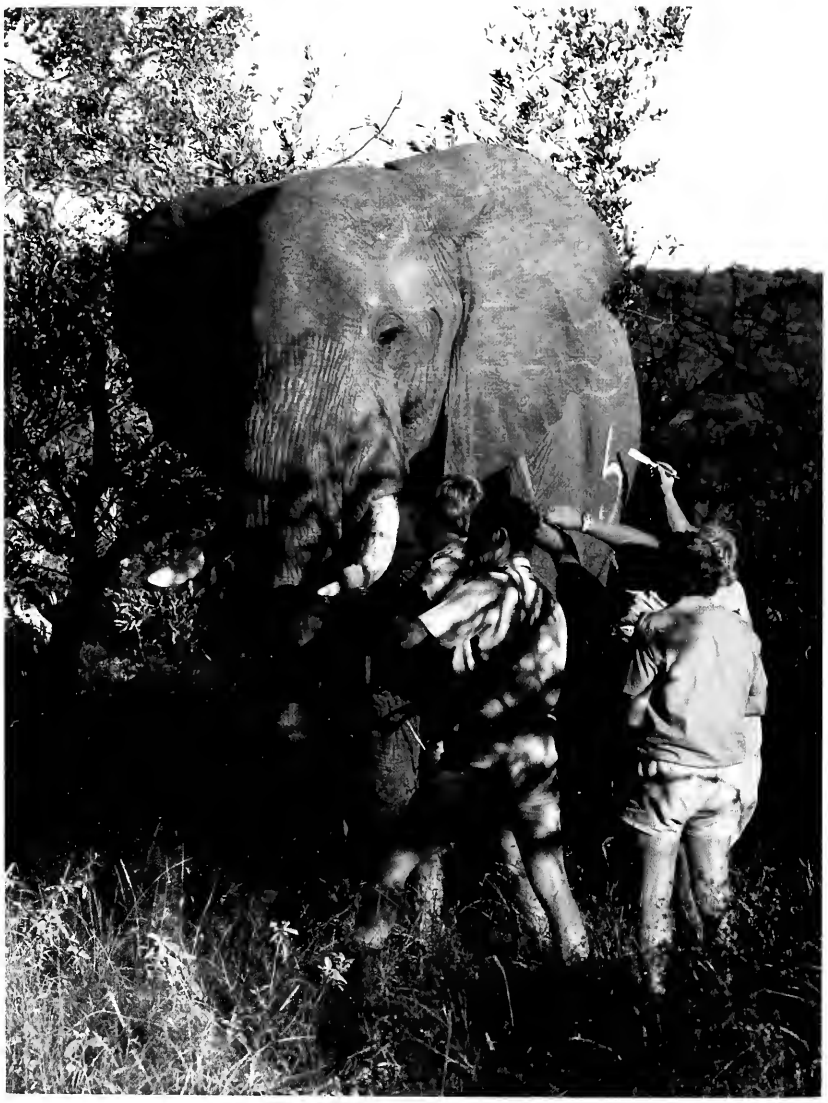

L. Stanton

n the spoor

big ones

Clive Walker,
Endangered Wildlife Trust,
Johannesburg

L. Stanton

In 1858 a petition, signed by 23 very indignant men of Rustenburg, was sent to the President of the Transvaal to protest against a restriction imposed on the sale of lead and gunpowder. "Because", they wrote, "as your Honour knows himself, we must make a living from game alone".

Those were the days when traders used to wait at Potchefstroom for the wagons of the hunters to come in from the north. At that time as many as 14 tons of ivory were sold per week. The Transvaal ivory trade, however, was already dying. There were very few elephants left.

Today elephants are still a common sight in the Kruger National Park, but outside the park there are only three small breeding herds in the Eastern Transvaal, all of them on private nature reserves. While the owners of the reserves treasure their elephants, they cannot always control the movements of the great beasts, for they live according to their own laws in the wide open spaces.

What influences the movements of these elephants? How many are there? How do they affect the habitat — and how are they affected by the habitat? These are just some of the questions we hope to have answered in the co-operative research programme which began with an aerial survey in September last year. A total of 89 elephants were counted in the Klaserie Private Nature Reserve, and this number includes two family groups. Not all these elephants necessarily "belong" to Klaserie, because they may move to any area from the Kruger Park. Indications are that there is a seasonal fluctuation in the numbers and distribution of elephants at Klaserie. In many parts of Africa it has been shown that the movements and ranges of elephants vary greatly, not only from area to area, but also from one individual to another. It seems likely that the factors controlling these differences are related to nutritional and breeding requirements.

To date, two immobilisation programmes have been carried out, with dr Eddie Young supervising and conducting the darting. The Endangered Wildlife Trust's chartered Hughes 300 helicopter was piloted by Pierette Paroz, who has piloted for the Trust on all its elephant-darting programmes, whilst the ground crew comprised Trust personnel, Transvaal Nature Conservation personnel and the wardens of the Timbavati Nature Reserve and the Klaserie Nature Reserve.

In a continued operation of this nature, success depends on each individual knowing precisely what his function is. It is important that each one knows the speed at which to carry out his task when attaching the nine ton breaking-strain collars (each one code-numbered), stamping tusks and marking them with silver nitrate. The job of recording all the available data about the elephant, from tusk measurements to ear patterns, was executed by prof. Koos Bothma of the University of Pretoria, while Petri Viljoen collected the necessary samples for subsequent analysis at Onderstepoort. Erwin Liebnitz, Warden of the reserve, Bruce Page, who came south from Tuli to assist and Nick Zambatis of the Nature Conservation Division had the task of placing the collars on the elephants. Often the elephant would go down in rough terrain, which required much lifting and heaving coupled with a good deal of spade work. Operations of this nature are not without their hazards when dealing with such large animals, and some moments of danger and tension were experienced. The calm attitude amongst all concerned, however, resulted in no losses and very little stress on all the elephants handled.

Once the elephants are marked we will be able to plot movements within the reserve and to trace individuals entering the Kruger National Park and this information may be picked up by the National Parks Boards staff during aerial surveys. It is planned to place radio transmitters on a bull and a cow during the early part of 1979 to facilitate the further plotting of elephant movements and their range utilisation. The use of a light aircraft will be employed for the radio-tracking programme in order to improve the range maps made from standard ground observations.

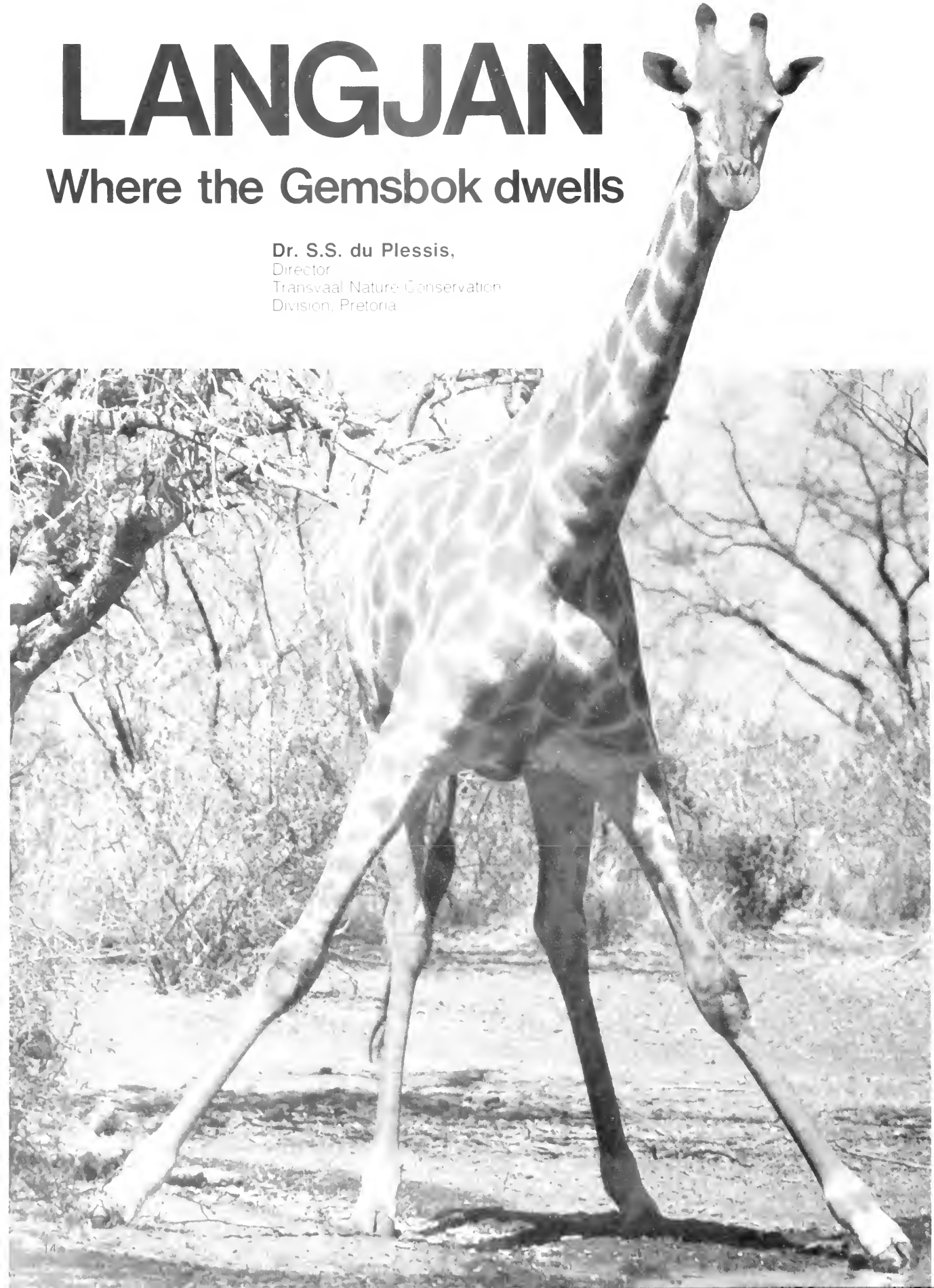
Nine elephant bulls and five cows now range Klaserie, wearing marked collars around their necks, while game-wardens and scientists will keep track of their movements — from a distance. The collars have a life-expectancy of approximately two years.

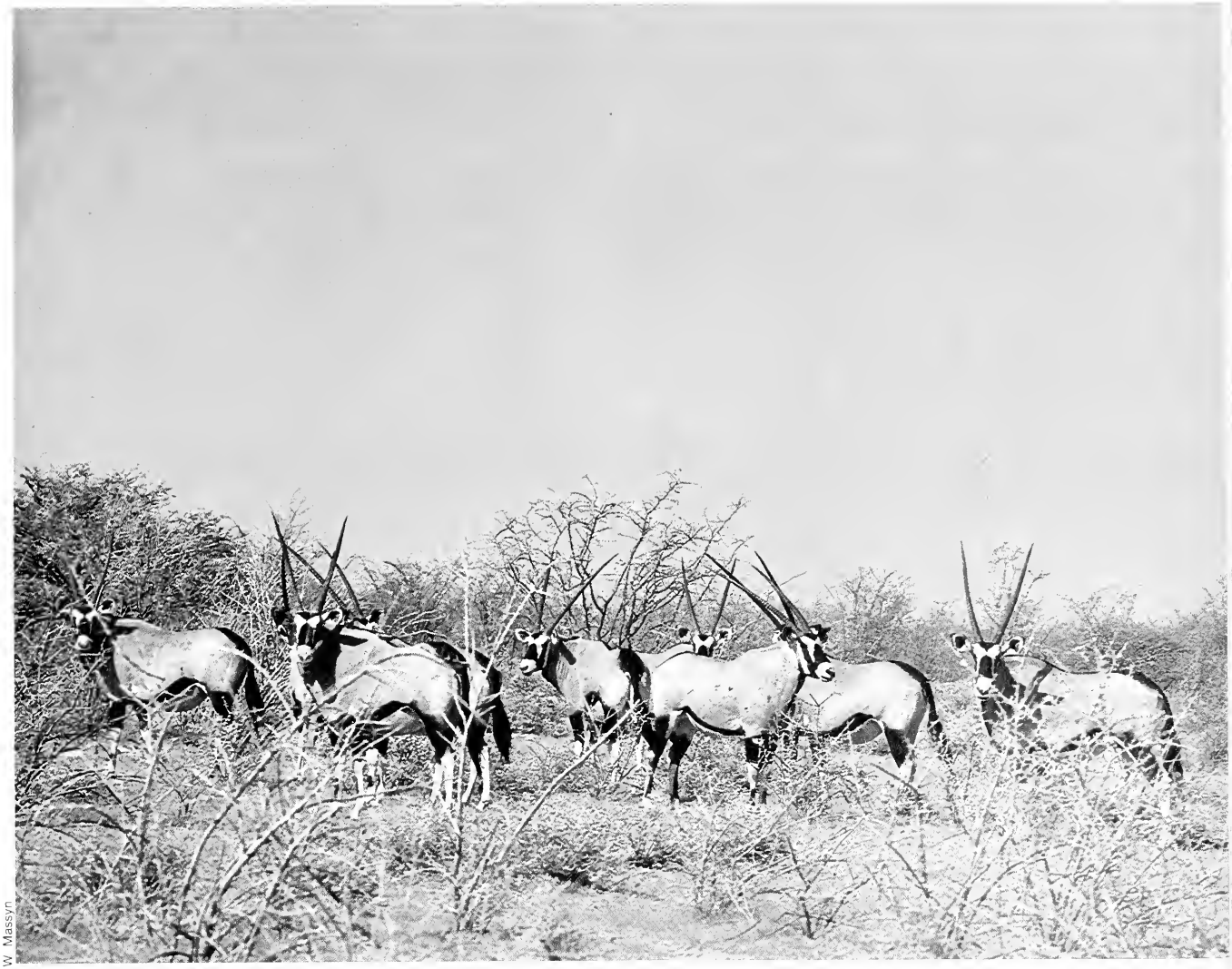
The Endangered Wildlife Trust and Education Wildlife Expeditions initiated this project as part of the IUCN Elephant Survey and the major costs are being borne by these organisations. The project is being carried out in conjunction with the owners and the warden of the Klaserie Private Nature Reserve, the Transvaal Nature Conservation Division and the University of Pretoria. □

LANGJAN

Where the Gemsbok dwells

Dr. S.S. du Plessis,
Director
Transvaal Nature Conservation
Division, Pretoria





W. Massyn

Langjan Nature Reserve once served an important role in saving the last gemsbok herd in the Transvaal.

In 1959 there were only 34 wild gemsbok to be found in the whole of the Transvaal. They occurred at Langjan, a farm situated in the arid, sweet bushveld of the North-western Transvaal near Vivo. Here the gemsbok were conserved as a result of the protection given to them by Mr. J.F. Engelbrecht, the owner at that time and his predecessor, Mr. W. Visser.

The farm was bought by the Administration in that year and was declared a nature reserve. Despite the fact that the farm was fenced and therefore game-proof, the gemsbok gradually decreased in number until, by September 1961, only nine bulls and one cow remained. By September 1964 they had dropped to the dangerously low level of only four animals. Over a period of approximately four years a total of 36 gemsbok were imported from South West Africa, the Kalahari and the North-western Cape. Successful breeding soon followed. In November 1970 seventy-five gemsbok were counted and in the winter of 1973, when 106 animals were present, the first gemsbok were captured for distribution to other localities.

Giraffe were established in this reserve in 1964. It is the only provincial reserve outside the Lowveld where giraffe occur. Since foot-and-mouth disease does not occur here, giraffe can be distributed to other reserves without undergoing the usual quarantine-period.

Other animals to be seen in this beautiful reserve are red hartbeest, kudu, waterbuck, impala and bushbuck. It is the only provincial reserve where the bat-eared fox occurs. Small predators are well-represented by the black-backed jackal, the caracal, the small-spotted genet, the large grey mongoose, the slender mongoose, the dwarf mongoose and the black-footed cat. Other interesting animal species are the pangolin and the python. The crested guinea-fowl has also been noted here.

Game flourishes in the dry bushveld since this area is particularly free of disease and parasites. It is, of course, ideal ostrich country. The Brak River, which flows through the reserve, offers an interesting habitat rich in bird species. There are large areas of calcareous soil which produces an excellent type of sweet grazing but which is sensitive to over-grazing. East of the river the deep, red soil produces a type of vegetation which differs completely from that found on the opposite side. It is especially suitable for browsers, such as kudu and giraffe.

Originally the reserve was only 1 500 hectares in extent which, due to the dry conditions, was too small to carry a variety of game. It was consequently expanded this year by acquiring a further 3 000 hectares. This additional land includes a large portion of the riverbank, an area comprising deep, red soil and the calcareous soil areas.

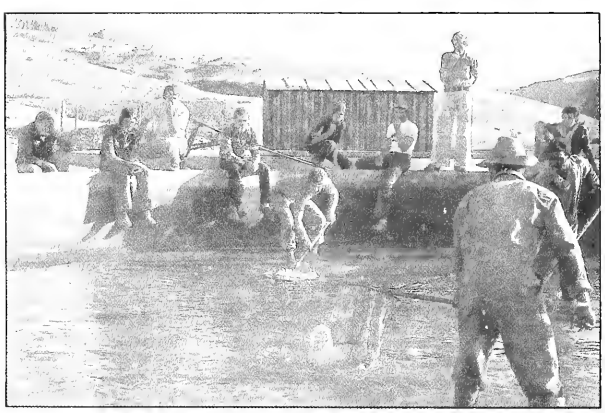
Today Langjan can function as a reserve in its own right. It will serve as a source of game for re-introduction purposes. At present it is also large enough to offer simple camping facilities and hiking trails. Thus it is possible for the people of the Transvaal to experience the charm of this "Kalahari of the Transvaal."

Practical training includes some hard work!

H. Kramer

Demonstration of wildlife investigational techniques.

H. Kramer



Lectures and demonstrations on fish production also form part of the course.

F. Smith

tainty, is whether there are sufficient job opportunities for students after they have graduated. Although it is not the function of the Colleges for Advanced Technical Education to act as employment bureaux, it is attempted to maintain an understanding with employers and to try to ensure that students are provided with job opportunities.

The Diploma in Nature Conservation and Management is definitely recommended for those who are interested in working as nature conservationists at national parks, provincial nature reserves or other localities where the principles of conservation are applied. Holders of this diploma have already been appointed to execute a variety of conservation tasks. Some are even involved in very important and interesting research projects, while especially the women, play an important role in information work. It is expected that private game farmers and even the Defence Force, will appoint trained nature conservationists at an ever-increasing rate. Whatever the future holds, the Diploma in Nature Conservation and Management offers a unique opportunity to anyone interested in qualifying himself/herself in the field of nature conservation. More details about these courses are available from the colleges mentioned. □

L. Davidson

Protea curvata.

the rarest tree in South Africa?

S.P. Fourie,
Senior Professional Officer,
Transvaal Nature Conservation Division,
Lydenburg

In the Lowveld, to the north-east of Barberton, is found what is considered as probably the rarest tree in South Africa — the Barberton lowveld protea, *Protea curvata*.

The Barberton lowveld protea was discovered on a single koppie in the lowveld near Barberton in 1893 by E.E. Galpin. In the years following the discovery, botanists were very uncertain about the exact locality and it was only during 1956 that the exact location of *Protea curvata* was finally established. Although the area has been thoroughly investigated, no other locality has since then been found and today the koppie remains the only known locality of *Protea curvata*.

Protea curvata is a slender tree which grows up to 6 m in height. It is found in association with *Acacia* and *Combretum* species. The large-leaved *Pavetta edentula* and Van Wyk's hout, *Bolusanthus speciosus*, also share the habitat with *Protea curvata*, on this small hill of talcose schist. The trees favour a south-facing slope and grow at an altitude of 830 metres.

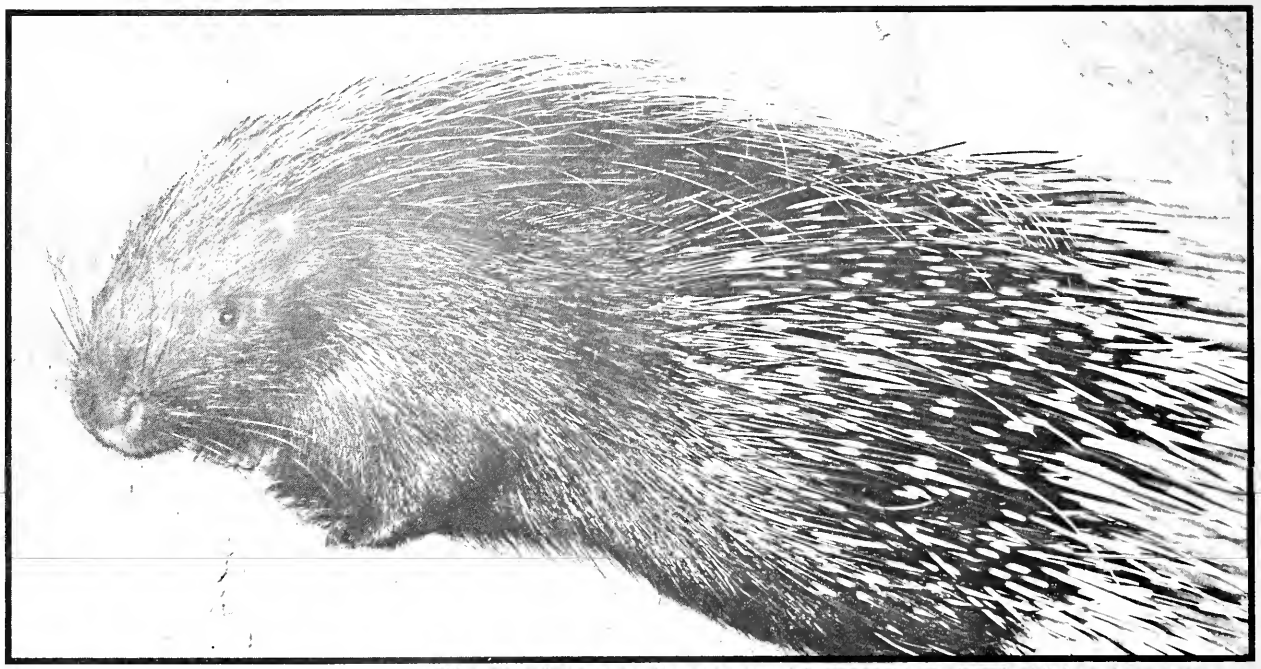
The tree is distinctive in appearance with long slender branches growing upwards from seemingly no specific stem. The branchlets are densely packed with slightly curved and narrow leaves. The specific name is derived from the shape of the leaves and means 'curved'.

The leaves are light-green in colour, leathery and smooth to the touch with the apex blunt and the base very narrowly tapering. The midrib is prominent on both sides and the margin is entire, hard and translucent.

The flowerheads are usually six to seven centimetres in diameter, stalked and short-necked. The bracts are a deep red in colour, velvety grey over the lower half and are usually much shorter than the pink and reddish flowers. Flowering time is usually from June to July. The fruit is a nutlet and usually appears shortly after the flowers.

A recent field survey of the area revealed that the habitat suffered badly through regular veld fires. The small stand of *Protea curvata* showed extensive damage as quite a number of trees were burned to the ground and others scorched so badly that only a few branches showed any signs of growth. The absence of seedlings indicated further that the population seems to be under pressure.

Due to the fact that *Protea curvata* is restricted in its distribution to a single koppie in the Barberton lowveld, and coupled with the facts that the recent survey revealed, it is obvious that a serious threat has developed which could place this lovely protea on its way to extinction. □



Transvaal Nature Conservation Division

Although not true pigs, the porcupine (above) and hedgehog (right) have been given pig-like names because of their habit of rooting in the ground.

aardvarks, hedgehogs and porcupines

Dr G. de Graaff,
National Parks Board,
Pretoria

Those of you who are thoroughly familiar with the indigenous animals of the Transvaal and elsewhere in the Republic should have no difficulty in distinguishing between warthogs, bushpigs, aardvarks, hedgehogs and porcupines. It is still doubtful, however, whether our knowledge of these animals is indeed as comprehensive as we would like to believe it is. To what extent are we conscious that, of these five kinds of mammals, only two truly belong to the pig family, namely the warthog, *Phacochoerus aethiopicus,* and the bushpig, *Potamochoerus porcus*. On the other hand the aardvark, *Orycteropus afer,* is a unique mammal which has no connection with pigs in the broad sense of the word. This also applies to the hedgehog, *Erinaceus frontalis,* which is an example of an interesting insectivorous mammalian group. The porcupine, *Hystrix africae-australis,* belongs in turn to the rodent family of which rats and mice are the best-known representatives. The colloquial names for aardvarks, hedgehogs and porcupines are therefore confusing and is one of the reasons that the scientific name of a species is always referred to. The apparent relationship between these animals is especially evident in colloquial English, when such terms as warthog, bushpig, aardvark, hedgehog and procupine are considered. All of them refer to the word "pig" and "hog", while "porcupine" is derived from the Latin word *Porcus,* which means "pig".

The only reason why I can imagine these terms to be so popular is perhaps the habit which real pigs have of rooting in the ground. Just like the warthog and the bushpig, aardvarks, hedgehogs and porcupines also root in the ground on the look-out for items on their menu, and it is perhaps this behaviour which has given rise to the use of the suffix -"pig" or -"hog".

As already mentioned, it is questionable whether we, in fact, do know more about these animals than merely being able to identify them. I would like to claim that we know very little about certain facets of the life-cycles of aardvarks, hedgehogs and porcupines (excluding real pigs, in this case) and that this is especially applicable when these animals are very young — in other words, when we can talk about them in the diminutive sense. If we happen to peruse the available literature, we shall discover that there are certain broad indications, but that many details of the early life cycles still remain mysteriously hidden. At this point I would like to briefly note some facts which one encounters in books or journals.

In the case of aardvarks a single young is born at a time and it is only on rare occasions that twins are born. The gestation period is still unknown, but the estimated period is seven months. The young are born in the characteristic aardvark holes and the mass at birth is approximately one to two kilograms. When the young are two to three weeks old, they begin to accompany the mother on her nocturnal outings. This raising process apparently continues until the young aardvark is about six months old, when he is capable of digging and fending for himself.

The gestation period of the hedgehog varies between 30 and 40 days and an average of five young are born at a time, but this figure can vary between two and ten young. As in the case of many other mammal species, the young are born blind. The eyes only open on about the ▷

L. Stanton

eighth day. The young are naked at birth and only a few soft quills are noticeable in the skin. The female is said to place the newborn young on her stomach where they immediately begin to suckle. Within two to three days the characteristic darkly-coloured quills are visible on the entire head, body and pelvic regions. When this little animal is about a month old, all its quills have developed and it is already able to curl itself up into a ball. This habit of rolling itself up or of contracting its body when it is disturbed, has given rise to the popular Afrikaans name of "Krimpvarkie". When it is approximately a month old it looks like a miniature edition of the fully-grown animals. By this time it accompanies its mother on her outings when she is searching for insects and other food. By about the fortieth day it is fully weaned. After this the mother-baby relationship is terminated and the young hedgehog goes off on its own, preparing to reproduce the following year.

Finally, some remarks concerning the young of porcupines. Observations in Rhodesia indicate that one to three young are born per litter between July and December. In this case the quills are also soft and flexible at birth and immediately afterwards. The young only start moving about and accompanying the mother when the quills have begun to harden after approximately fourteen days. The gestation period varies between 42 and 56 days. The young have a birth mass of approximately three hundred grams each and are born in hollows in underground tunnels which are lined with vegetation. Their eyes open very soon after birth. The porcupine has the habit of directing its hindquarters at a possible source of danger and rattling its quills. This habit is present even when the animal is very young.

The above represents only a short description of the weal and woe of young aardvarks, hedgehogs and porcupines. Very little, however, is as yet actually known about these animals and much research remains to be done to complete their "tale". □

The warthog (right) and bushpig are the only true wild members of the pig family, occuring in South Africa.

L. Stanton

the BALD IBIS

J. van Jaarsveld,
Taxidermist,
Transvaal Nature Conservation Division
Pretoria

The Bald Ibis *Geronticus calvus*, is listed in the South African Red Data Book as an endangered species. It is endemic to Southern Africa and is protected by law in the Transvaal, where 37 breeding colonies have been recorded to date.

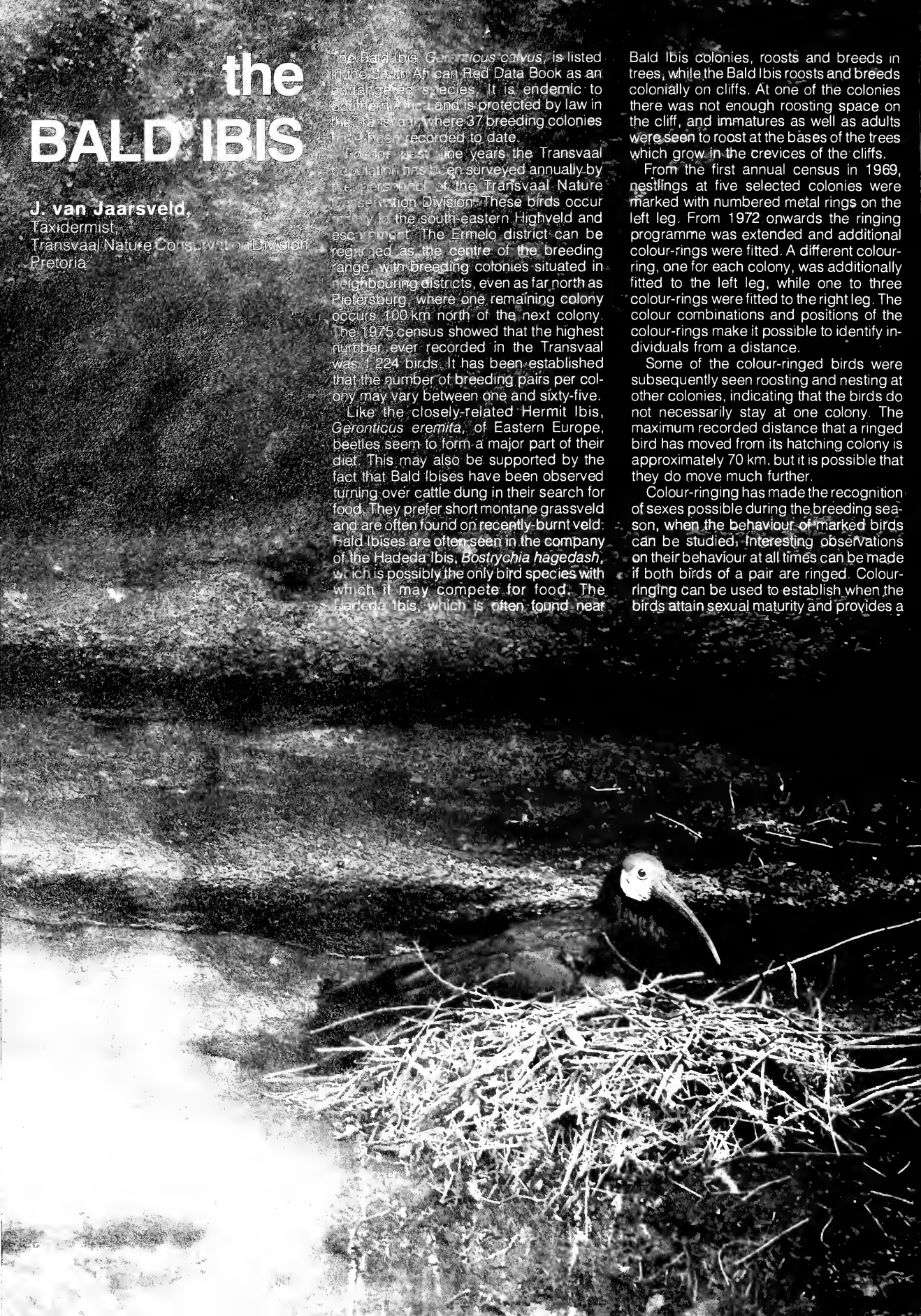
During the past nine years the Transvaal population has been surveyed annually by the personnel of the Transvaal Nature Conservation Division. These birds occur mainly in the south-eastern Highveld and escarpment. The Ermelo district can be regarded as the centre of the breeding range, with breeding colonies situated in neighbouring districts, even as far north as Pietersburg, where one remaining colony occurs 100 km north of the next colony. The 1975 census showed that the highest number ever recorded in the Transvaal was 1 224 birds. It has been established that the number of breeding pairs per colony may vary between one and sixty-five.

Like the closely-related Hermit Ibis, *Geronticus eremita*, of Eastern Europe, beetles seem to form a major part of their diet. This may also be supported by the fact that Bald Ibises have been observed turning over cattle dung in their search for food. They prefer short montane grassveld and are often found on recently-burnt veld. Bald Ibises are often seen in the company of the Hadeda Ibis, *Bostrychia hagedash*, which is possibly the only bird species with which it may compete for food. The Hadeda Ibis, which is often found near Bald Ibis colonies, roosts and breeds in trees, while the Bald Ibis roosts and breeds colonially on cliffs. At one of the colonies there was not enough roosting space on the cliff, and immatures as well as adults were seen to roost at the bases of the trees which grow in the crevices of the cliffs.

From the first annual census in 1969, nestlings at five selected colonies were marked with numbered metal rings on the left leg. From 1972 onwards the ringing programme was extended and additional colour-rings were fitted. A different colour-ring, one for each colony, was additionally fitted to the left leg, while one to three colour-rings were fitted to the right leg. The colour combinations and positions of the colour-rings make it possible to identify individuals from a distance.

Some of the colour-ringed birds were subsequently seen roosting and nesting at other colonies, indicating that the birds do not necessarily stay at one colony. The maximum recorded distance that a ringed bird has moved from its hatching colony is approximately 70 km, but it is possible that they do move much further.

Colour-ringing has made the recognition of sexes possible during the breeding season, when the behaviour of marked birds can be studied. Interesting observations on their behaviour at all times can be made if both birds of a pair are ringed. Colour-ringing can be used to establish when the birds attain sexual maturity and provides a



basis for obtaining other valuable information on their reproductive behaviour.

The Bald Ibis occurs only in South Africa, Lesotho and possibly in Swaziland. This puts the responsibility of conserving the species squarely on the conservation authorities of these countries.

The results of past censuses indicate that the Transvaal population has remained relatively stable, but this gives no reason for complacency. A number of factors, including human predation and vandalism, darkly clouds their chances of survival.

Below the cliffs at one of the colonies, spent 0,410 shotgun shells and 0,22 cartridge cases were picked up during a census. At the beginning of the 1977 breeding season the law-enforcement officer at Ermelo arrested a youth who had used an airgun to shoot at breeding bids to supply a witchdoctor with medicinal material. At other colonies vandals have thrown stones at eggs and chicks when they could not otherwise be reached. In addition, egg-collectors have visited some of the larger colonies of the Transvaal and robbed the nests.

Every year, during the breeding season, local habitants rob the nests at some of the colonies to obtain the eggs and nestlings for food. At one colony every nest within reach, including those of swallows, swifts, weavers and Rock Pigeons, was robbed. In this case there were ten Bald Ibis nests, of which five were robbed. Evidence left by poachers at another colony included rusty wire devices and sticks. These objects were removed and destroyed by [illegible] searchers and this, together with subsequent convictions, has resulted in the fact that poachers now rob the nests only after each census has been completed, since new devices were found the following year.

Predators other than humans are seldom recorded. During the 1977 survey, an adult female Lanner Falcon, *Falco biarmicus*, was seen stooping at a flock of roosting Bald Ibises where they were sitting on a cliff, and struck at an ibis. The ibis did not seem to be injured and flew back to its original roost. During the 1972 census it was recorded that a Pied Crow, *Corvus albus*, robbed a nest of eggs. Other animals, like the rock leguaan, *Varanus exanthematicus*, and the common egg-eating snake, *Dasypeltis scabra*, are also potential predators. Natural predation does not present a serious threat to the Bald Ibis when compared with human predation and vandalism. It is ironical that the future of this bird seems to lie in the hands of those who threaten its existence most. □

Bald Ibis nestlings [illegible] parents.

the hippo
— LIVING SUBMARINE

Jayne Deeks,
Assistant,
Division of Conservation
Awareness Communication,
Wildlife Society of South Africa,
White River

Gunmetal grey, the hippopotamus gleams smoothly as it floats, seemingly buoyed up by layers of fat, unhampered by its cumbersome weight and shape in the freedom it finds in the water.

On land they are grotesque, awkward creatures, lumbering around on short, stumpy legs, yet in the free-flowing river they gain grandeur. A mammal, which by rights should be confined to dry land, the hippo has adapted so totally to an aquatic life-style that even its young are born, reared and suckled in this weightless, womb-like world. Water-tight nostrils that snap shut and eyes that protrude periscope-fashion are only two of the adaptations the hippo has made to living in water 50 to 60 percent of its life-time. It is only at night, when the fierce sun has set, that the hippo clambers out to wander along the reedbeds and riverbanks. There it forages for approximately 60 kg of aquatic and riverine vegetation which it consumes each night in order to maintain its tremendous bulk. The hippo cow averages 2,5 tons, and a large bull can weigh almost four tons.

Broad, well-defined paths demarcate the hippo routes. In the Okavango Swamps these routes can be traced in the waterways, where hippo clear pathways for themselves and for others, through the waving masses of weeds.

A diurnal visitor to the deep still pools in the river, the hippo is an ecological entity of considerable importance. His perambulations on the river bed stir up the thick, viscous bottom mud, releasing nutrients into the water, while those tons of consumed vegetable matter are rapidly converted into large quantities of highly nutritious excreta. The growth of plankton is promoted by these actions.

Plankton form the basic diet of many smaller fish which in turn, are major items on the menus of predator fish. The largest predator fish of all is the barbel, which constitutes 70 percent of the crocodile's diet. The hippo and the crocodile live together amicably since (other than when they are young) hippo are rather large fare for crocodile to tackle.

Masticated grass that is washed ashore provides an ideal breeding ground for mosquitoes, flies and dragonflies. Insectivorous birds and frogs are attracted to the water's edge, where they become targets for the heron's spear-fishing tactics. Not only do the waste-products of the hippo provide food for a multitude: within the hippo's stomach a seething mass of microscopic *fauna* feed upon the partially digested vegetable-matter, while a highly selective bilharzia parasite, *Schistosoma hippopotami*, can only exist within the hippo's circulatory system.

Partially submerged hippo, with just ears, eyes, nostrils and a ridge of back protruding, provide floating platforms for fish-catching herons, frog-catching hamerkops, dry-cleaning cormorants and sunbathing turtles — veritable living submarines! □

D. Wolff

Hippo may be found grazing several kilometres away from water at night. Although they may often be seen basking in the sun on sandbanks, they spend fifty to seventy percent of their life-time in water.

R. Taylor

L. Stanton

Foot-and-Mouth disease makes black sheep of impala and other game

Dr Dudley Gradwell,
State Veterinarian,
Kruger National Park

Foot-and-Mouth Disease (FMD) has been known from the earliest times and today is still a very important disease economically. Control measures in many countries have to be implemented to prevent the disease from entering the country and also from spreading once it is in a specific country. The heaviest losses incurred by any country from FMD, usually result from the deterioration of affected animals and economic implications.

FMD is a highly contagious viral disease which can affect any cloven-hoofed animal as well as hedgehogs, camels and the Indian elephant. Man is also susceptible but very seldom shows any clinical symptoms. Once an outbreak of FMD occurs, the spread of the disease takes place by contact between animals but spread is also possible *via* the hands and clothes of human workers, on vehicles, birds' feathers, etc. Probably the most dangerous is the illegal movement of meat, skins, milk or trophies from such an area to non-infected areas. Meat, milk, butter or cheese that contains virus and is kept refrigerated, can maintain the virus alive for extremely long periods and can also be responsible for the dissemination of virus over large areas. As far as game is concerned poaching and the removal of the meat and trophies from infected areas, is probably the biggest danger for the rapid spread of the disease.

Wildlife has always been incriminated as the reservoir of FMD and this, I think, has now been shown to be the case in buffalo, as they remain asymptomatic carriers of the disease for over two years. But nobody has, as yet, been able to show how the virus, which is harboured in the throat of the buffalo, escapes to reinfect other game or domestic animals. In fact, Condy and coworkers in Rhodesia were unable to produce FMD in susceptible cattle that were kept in the same pens as carrier buffalo, despite the fact that they slaughtered one of the positive carrier buffalo in the pen harbouring the fully-susceptible cattle. There must be some mechanisms or climatic conditions which are necessary for this transfer to take place, or else another possibility is that poachers, who illegally remove the meat of poached animals in the viraemic stage, set up sites of infection in areas where animals are susceptible to the disease.

Some viruses causing diseases in the USA are known to be harboured by snakes during winter, and in this way, the virus is safely taken through the cold winters by hibernating snakes. It is a possibility that some reptile or other animal may carry the virus of FMD at times in a similar way and be the cause of outbreaks in various ways. So much is not yet known about the disease and game animals that many questions remain to be answered.

The impala, I feel, is not responsible for new outbreaks of FMD. They become in-

E. Young

E. Young

While foot and mouth disease causes only very small or no lesions in buffalo (left) cattle react much more dramatically and usually develop massive lesions in their mouths (right) and on their feet.

E. Young

E. Young

Fresh foot and mouth disease lesions, (left) develop on the edge of the hooves of impala and other susceptible species. Resulting cracks in the hooves (right) move progressively down with the growing hoof, to reach it's tip after four to five months. Ageing of a previous infection can thus be determined from the position of the cracks on an animal's hooves.

fected either *via* cattle or buffalo and then, because of their vast numbers, are responsible for secondary spread of FMD. We are all aware of the regularity with which impala may be seen in parks and game farms, and once the disease has established itself in such an area, it may spread through the population over a large area and only be stopped by natural barriers, such as large rivers or tracks of land where no water, and therefore no animals, is available. Poaching, again, can play an important role in the spread of the disease.

Other wild animals are also of secondary importance in FMD spread and must first come into contact with infection *via* cattle or buffalo, although eland have also been incriminated as asymptomatic carriers. Many species may harbour the virus for a certain period after clinical manifestation of the disease. One animal that I feel has been given a bad name in this respect is the African elephant. The Indian elephant has been shown to be naturally susceptible to FMD but I am convinced that its African counterpart is not a natural carrier or even susceptible to FMD under field conditions.

The equidae, which include the zebra, are not susceptible to FMD, but this does not mean that they can be indiscriminately moved from FMD areas as there is still the possibility of virus being present in the bedding used or even ticks that may recently have fed on FMD infected animals. The rules and regulations regarding the transport of animals are very strict, but rightly so as well, and as we have seen briefly from the above they are all based on sound principles and not just thought up in an office for the sake of making regulations.

So there is no doubt about the importance and need for extremely strict control measures which will inevitably restrict the free movement of game and game products from certain danger areas like the Kruger National Park and farms adjacent to it. Just a single slip up here could cost the country millions of Rands and what makes it even more difficult is the fact that so much is not known about the spread of the disease from game to domestic animals, or *vice versa*, that suppositions have to be made and have, therefore, given some animals a bad name. What is needed above all is intensive research into all aspects of FMD, but in particular the reasons for sudden outbreaks of the disease. □

THE BAT-EARED FOX

Dr Reay N. Smithers,
Mammal Research Institute,
University of Pretoria

R. Smithers

The most characteristic feature of the bat eared fox is it's huge ears. This picture of a female illustrates the typical white forehead and dark, narrow muzzle.

Distribution of the bat eared fox in Africa.

In Southern Africa the bat-eared fox, *Otocyon megalotis megalotis,* represents one of the Canidae family. The remaining three members are the wild dog, the black-backed jackal and the Cape fox.

In East Africa, some 2 000 km distant, a closely-related bat-eared fox species, *O. megalotis vergatus,* is encountered. In the area which lies between the natural habitats of these almost identical-looking animals, the bat-eared fox is not to be found at all. Many years ago it was thought that their original distribution was uninterrupted in this area and that originally they could have belonged to the same species.

It now would appear that the bat-eared fox is occurring in an ever-widening area in the South. In the Chobe National Park in north-western Botswana, for example, these little creatures were unknown. After they had made their appearance in this area, they increased and spread to such an extent, that by March 1970 they were sighted in neighbouring districts in Rhodesia. In Southern Rhodesia, east of Gwanda, they were totally unknown until they appeared at Buffalo Bend on the Nuanetsi River in 1967. In June 1969 dr U. de V. Pienaar reported that he had seen them even in the Kruger National Park. They also occur in other parts of South Africa.

Throughout their range they are particularly associated with open, dry country, such as open plains, or scrub savannah. As a rule they do not occur in woodlands or desert areas. Within the Republic their distribution coincides with that of the harvester termite, *Hodotermes mossambicus,* which is one of the principle food items of the bat-eared fox. They usually occur in groups of up to six and can be seen by day, in undisturbed areas, which is when they are most active. They are otherwise predominantly nocturnal and pass the daylight hours in the shelter afforded by the dense bush.

With its narrow muzzle, light build and slim legs, the bat-eared fox is the daintiest member of the Canidae family. This attractive little animal stands about 30 cm high from the shoulder and has an approximate mass of only five kilograms. Their most characteristic feature is their huge ears which can reach a length of 13 cm. The ears are continually turning and twisting independently. The bat-eared fox's sense of hearing is so well-developed that he is able to hear the underground movements of beetle larvae and termites, or the rustling of insects in the grass.

Prey which it locates under the ground is quickly dug up with the forepaws. The holes which it digs are narrow since, when it excavates, it uses one paw at a time. No other mammal has as many teeth as the bat-eared fox. Forty-two to fifty teeth easily renders it capable of mincing the insects which it eats. Although its diet is not limited to insects, research has indicated that they do comprise approximately 88 percent of its diet. Harmful insects, such as termites, beetles, beetle larvae, locusts, moths and ants are also eaten. Scorpions (22%), rats and mice (17%) reptiles, including snakes and lizards (14%), wild fruits (14%), hunting spiders (11%) and millipedes and centipedes (7%), also comprise an important part of their diet.

During the colder months the bat-eared fox's fur is long and in prime condition and it is during this time that these little creatures are ruthlessly hunted in Botswana. Their beautiful skins are used to make karosses which fetch high prices.

Litters of up to six young are born during the warm wet season. Few pups reach maturity, however, and only two or three pups are usually seen accompanying their parents. The young are born mostly in deserted spring-hare or aardvark holes where they are left safely hidden while their parents are hunting for food.

In Afrikaans the bat-eared fox is also known as the "draaijakkals". When pursued its bushy tail is flicked from side to side and, while the tail is pointed in one direction, the bat-eared fox will unexpectedly turn to the opposite direction. Hence its name, "draai-jakkals".

Since it is partial to termites and other harmful insects, the bat-eared fox is a real asset to the farmer, but has many enemies: not only is it hunted for its fur, but often farmers also destroy it, wrongly believing that it is a sheep-killer. Larger carnivores, such as the brown and spotted hyenas and the wild dog prey upon this little carnivore, while large numbers are killed on our national roads.

Today the practice of large-scale trading with the fur of these little animals is something of the past, since stricter control measures are being applied and various national parks and nature reserves are offering them adequate protection. A special research programme, aimed at learning more about the bat-eared fox and sponsored by grants from the CSIR and the Transvaal Nature Conservation Division, is now being undertaken. The results of this programme will contribute towards the better protection of this attractive and helpful little creature. □

L. Stanton

Transvaal Nature Conservation Division

PROTEAS of the Transvaal

M. van Biljon,
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Hartbeeshoek Provincial Nursery,
Transvaal Nature Conservation Division,
Pretoria

Illustrations and descriptions of the first discoveries of South African Proteas appeared as early as 1605, but it was only during 1735 that Linnaeus named this genus *Protea*. The Protea is named after the Greek god 'Proteus' who could, according to tradition, undergo transformations at will.

One hundred and thirty protea species, which are widely distributed throughout Africa, south of the Sahara, have been identified. In the Transvaal alone, thirteen species occur.

The proteas which occur in the summer rainfall areas of the Transvaal and Natal differ considerably from those which occur in the winter rainfall areas of the Western Cape. In the first place the Transvaal protea has a tougher-looking exterior as the result of the more severe climatic conditions, although some species flourish in the wetter parts of the Transvaal. Another difference is that the bracts of the Transvaal protea are shorter than the flowerhead while the opposite is true in the winter rainfall areas. The only exception is *Protea roupellieae* where the bracts are longer than the flowerhead. The beautiful red flowers of this protea are a worthwhile spectacle in the Drakensberg ranges of the Eastern Transvaal and also occurs in the Eastern Cape. The mentioned differences do not alter the fact that the Transvaal boasts unique varieties, most of which are exceptionally pretty and rare.

The well-known Transvaal sugar-bush, *Protea caffra*, covers the slopes of Suikerbosrand near Heidelberg, the Magaliesberg and can also be found further eastwards and southwards. As a result of its distinguishing characteristics, this protea appeared on the threepence coin for many years, and has thus become generally well-known.

In the Magaliesberg mountains, *Protea gaguedi* occurs frequently with the ▷

Protea roupelliae.

Transvaal sugar-bush. The first-mentioned blooms during winter while the latter blooms in the summer months. In spite of this the two species are still being confused. *Protea gaguedi* is widely distributed, mainly in Rhodesia and the Eastern Transvaal.

Protea rhodantha and *Protea multibracteata* are closely related to *Protea caffra*. These three species show a definite similarity, but nowhere are they seen growing together. The distribution of *Protea rhodantha* is limited to the mist belt of the Eastern Transvaal, while *Protea multibracteata* grows in the south-eastern corner of the Transvaal.

Protea rubropilosa is without any doubt the prettiest of all the Transvaal proteas, and is so called because of the soft red-brown hairy covering on the bracts. It was first discovered, scarcely twenty years ago in the Blyde River Canyon. The distribution of this protea, which blooms in springtime, is limited to the Wolkberg and Blyde River Canyon areas.

The Barberton sugar bush, *Protea comptonii*, is one of the rarest species and is found only in the mountains around Barberton. In winter they bloom in a spectacular pink array.

Most of the protea species occurring in the Transvaal are tree varieties but a few low-growing species are also found, which include *Protea parvula*, which grows on Mount Anderson, *Protea transvaalensis* of the Northern Transvaal and *Protea simplex*, which occurs in the Eastern Transvaal and *Protea laetans*, a new discovery from Blyde River Canyon.

In the Transvaal the Proteaceae family is not limited to the genus *Protea*. The pretty pincushion, *Leucospermum gerrardii*, for instance, flourishes in the mountains near Barberton. □

Protea welwitschii.

Protea laetans.

L. Stanton

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Protea caffra.

Protea rubropilosa.

L. Stanton

*Crowned Crane/**Balearica regulorum.***

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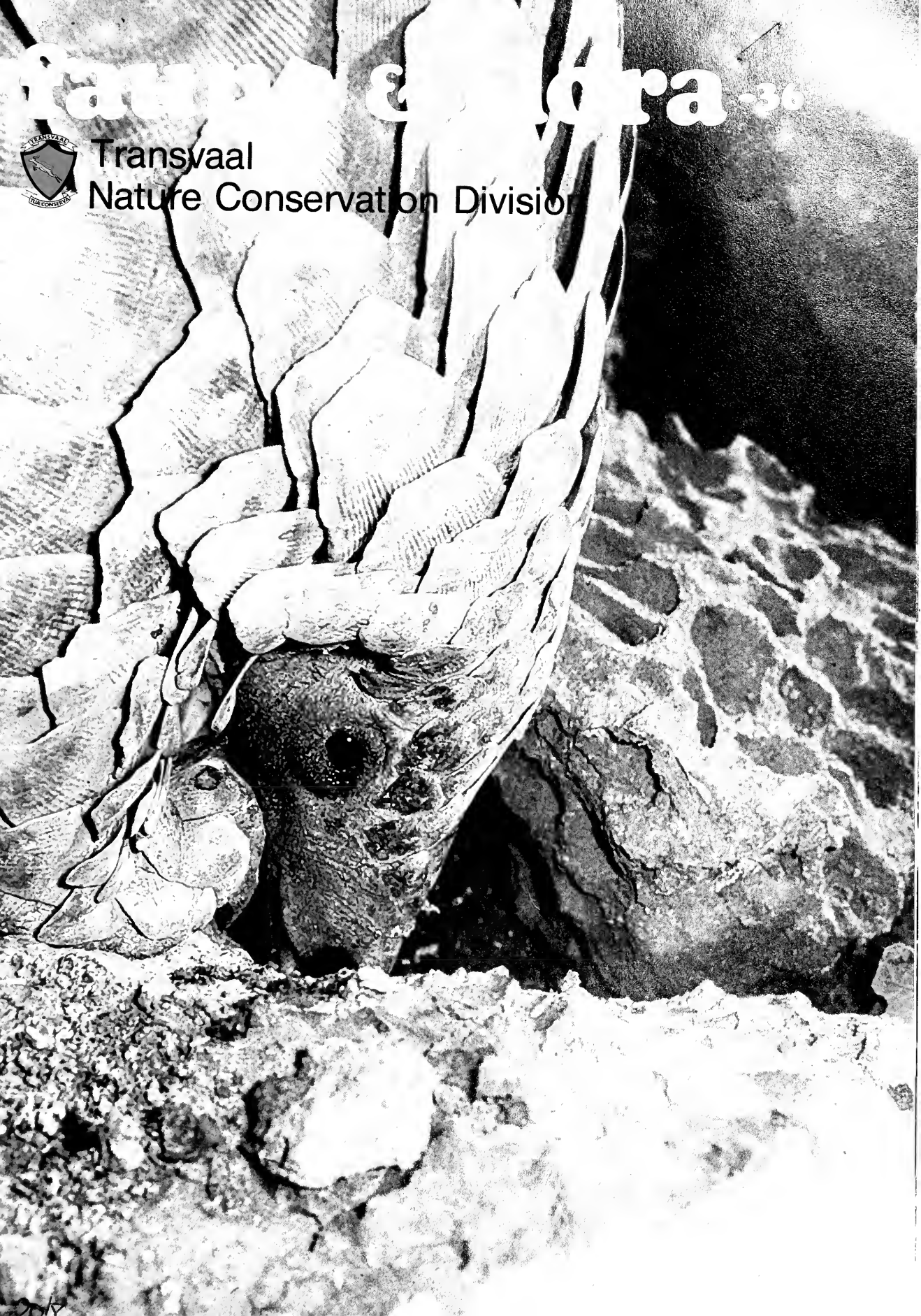

fauna & flora

FEBRUARY 1980 **NUMBER 36**

TRANSVAAL NATURE CONSERVATION DIVISION

CONTENTS:

The Kadishi Trail 2
The Wattled Crane 4
Pesticides pose a threat to wildlife 6
Water hyacinth worries 10
The pangolin 12
The Nyl's birds 14
The art of artificial lure angling 18
Children of the sun 22

Front cover:
Cape pangolin.
Photograph: Lorna Stanton

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the KADISHI TRAIL

Jo Onderstall
Amateur Botanist
White River

The Kadishi is a small stream which has its origin in the dolomite mountains near the Blydepoort Resort on the Eastern Transvaal escarpment. It meanders through the hills and then drops very steeply, and finally tumbles into the Blyde River, where it becomes part of the spectacular canyon which affords some of the most beautiful scenery to be seen in our lovely country.

An interesting nature trail has been laid out on the steep slopes of the Kadishi valley. It begins beneath the towering cliffs of black reef quartzite, zig-zags down the slopes, pauses to provide a glorious view of the recently completed Blydepoort Dam and then descends sharply to the bottom of the gorge where it crosses the clear, cold Kadishi before it winds back again up the opposite slope.

If you're an experienced walker or hiker who is bent on exercise, you can do the trail in under one-and-a-half hours with ease. If (like me) however, you are interested in every tree, flower, fern and aloe, or are curious to learn the local geology, it could take you much longer. I was fortunate enough to have with me a copy of the trail guide drawn up by Lynette Davidson and Margaret Marker from the departments of Botany and of Geography and Environmental Studies of the University of the Witwatersrand . . . so, instead of being an endurance test, the trail for me became a journey of delight.

In summer, every step of the path is fascinating. You pass a tremendous variety of *flora*, which can be identified quite easily if you refer to the guide. Along the way you encounter gnarled cabbage trees, the graceful bush beechwood, stamvrug, kiaat and wild pear trees and the flowering African wattle. Numerous *Combretum* species with their attractive four-winged fruits, several species of fig and many, many more other plant species can be seen along this route. On this high section you will also come across large numbers of Blyde protea, recently "discovered" and named by Lynette Davidson herself.

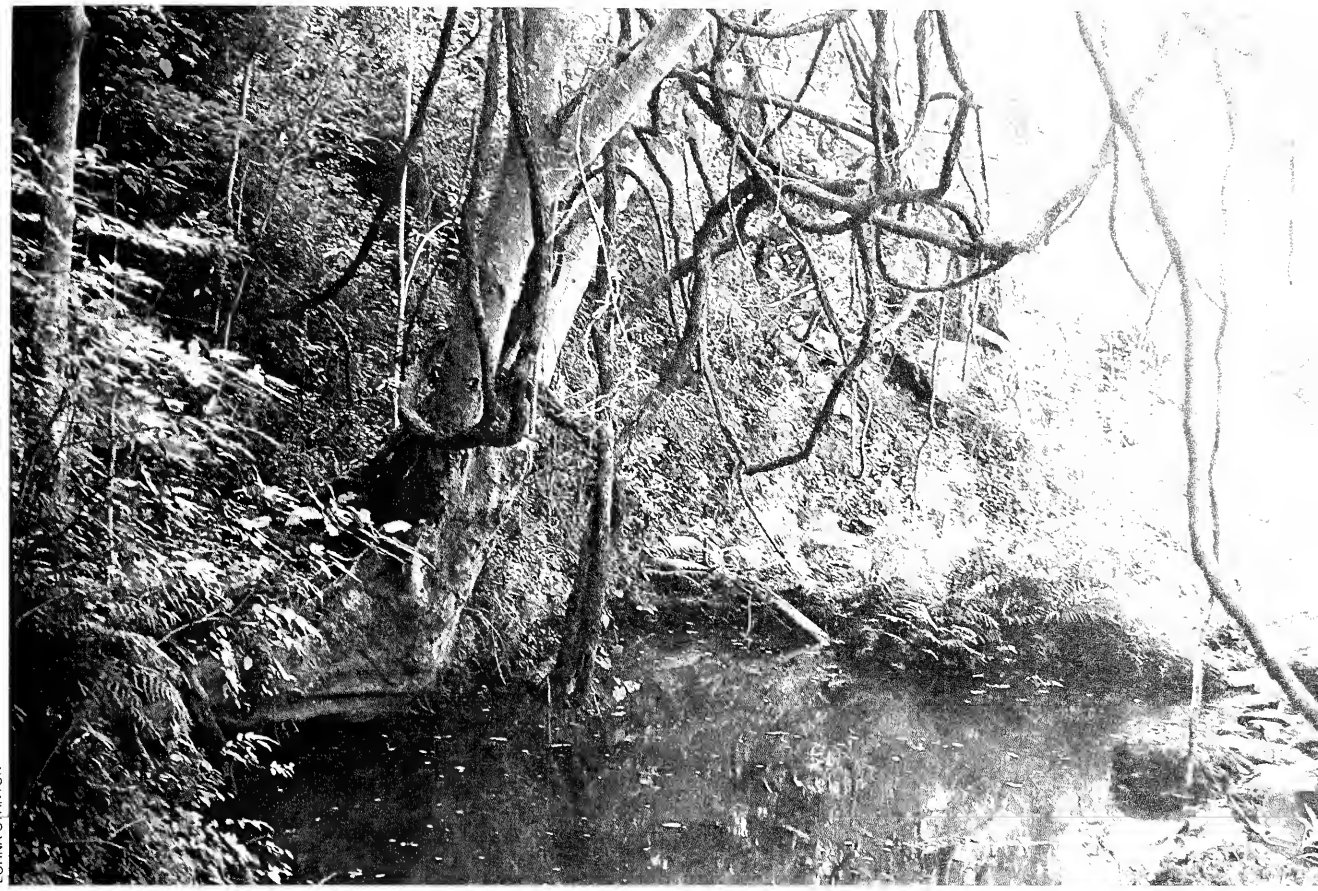
Near the viewing site of the dam there is a subtle change in the *flora* . . . here we find a few plants which do not occur higher up, like the impala lily, the carrot tree, the common star-chestnut, the spekboom and the sneezewood which, in autumn dots the hillsides with patches of brilliant yellow. Then suddenly it is cool where you cross the Kadishi under the shady magnificence of the weeping boer-bean surrounded by many enormous specimens of matumi. One of the two palms indigenous to the Transvaal, the wild date palm, also grows here.

It is interesting to examine the rock faces over which the waterfalls cascade. They consist of *tufa* which is formed by calcium carbonate deposits which are carried by the stream from its origin in the dolomite hills. This peculiar porous deposit overlies its quartzite base and is particularly evident along the Fern Trail which is a short offshoot near the start of the main trail. Here there are lovely tranquil, fern-fringed pools and cool vistas beneath the high, dappled canopy . . . it is well worth the short detour.

The climb back to the drier, hotter side of the valley presents yet another change of scene and *flora*. Here there are wild olive trees, sumach bean, (described to me by a botanist as an "underground tree"), sickle bushes with their lantern-shaped flowers, velvet *Commiphora*, sandalwood trees and many other plants associated with drier conditions. Two attractive creepers occurring here are the white-flowered wild cotton and the *Buttonia* creeper which has lovely pinky-mauve blooms.

Near the end of the walk you approach a cool marshy area where ferns and mosses grow in the shade of large Umdoni trees. Once again you cross the Kadishi, after which a short steep hike takes you back to camp or to your vehicle.

Whether you are a conditioned hiker who strides it out, or a botanist who ambles along, exploring every single thing on the way . . . whichever you are, you will find the Kadishi Trail an immensely satisfying and rewarding experience. □



Above: The tangle of tall trees and lianas which form a canopy over the tufa-*rimmed pools of the Kadishi River*
Left: A tree orchid – Tridactyle tricuspis.

WARWICK TARBOTON

the wattled crane

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Deryck Day
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If any bird is a caricature of the statesman in his pinstriped suit it is the Wattled Crane. It has the correct, tall, upright stance, the right air of dignity and composure, and even a grey waistcoat which shows off its long white neck and face to great advantage. One almost expects the bird to pull out a fobwatch and consult the time. Even when it walks it seems to keep its image in mind and takes purposeful, measured strides; only if pressed closely does it take to flight.

It is one of the three crane species resident in Africa, and one of the 14 to be found in the world. As a group the cranes of the world have fared badly from man's exponential population growth. All are birds of marshland and grassland and these habitats are disappearing unremittingly under intensive agriculture and afforestation. Two species face extinction and several others have disappeared from large parts of their former ranges. The total world population of one species, the North American Whooping Crane, has declined to a handful of birds (as low as 14 in 1938) and great efforts are being made to keep the species alive, including stringent protection measures and captive breeding. While none of the African species has declined to such critically low population levels, the case of the Whooping Crane serves as a stark reminder of what can happen.

Wattled Cranes occur as two discrete populations in Africa, one centred in Ethiopia and the other extending from southern Tanzania to South Africa. In a recent assessment of its status, it was found that the largest numbers of the species were to occur in Zambia, particularly on the Kafue Flats, and in the wet parts of Botswana. In South Africa it has disappeared from the Cape Province, although it formerly occurred as far south as Cape Town, and its present breeding distribution appears limited to the higher parts of Natal and the south-eastern Transvaal. It is localised in its occurrence here and is nowhere very common. Appropriately, the South African Red Data Book lists it as "rare and threatened".

Much of what is known about its biology and breeding habits is the result of observations made by Dr. West of a pair which nested for five successive years at the Grassland Research Station in Zimbabwe. This pair occupied a large, grassy vlei

LORNA STANTON

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Left: A Wattled Crane at its nest. South Africa's two other crane species are the Blue Crane (above) and the Crested Crane (below).

which they continuously defended against other Wattled Cranes, and each year during winter they built a nest and laid eggs. The clutch numbered one or two and an incubation period of about 40 days was recorded. Only one young was raised irrespective of the number of eggs laid. In five years the pair laid six times and reared three young. This demonstrates the low breeding output of the species: an average of 0,6 young per pair per annum. The chicks are dependent on the parents for a long period; they fly for the first time when 15 - 18 weeks old but still remain with the adults for several months after this. When fully grown they can still be distinguished from mature birds by the absence of the dark brown skull-cap which the adults have, by the absence of red "warts" at the base of the bill and by their smaller wattles.

Wattled Cranes, in common with most of the other cranes, perform an extraordinary ceremonial dance on occasions, usually directed by one member of a pair at its mate. The dance is usually done in silence and consists of buoyant hops on the ground with wings spread. At the same time the bird bows its head to pick up pebbles or twigs on the ground which it tosses into the air. It is an extraordinary display and in a flash destroys the sedate image that went before.

In the Transvaal we have found that pairs traditionally live in certain vleis and breed there year after year, a situation resembling that recorded by Dr. West. Where the habitat permits, several pairs may occur and breed within a few kilometres of one another. The size of the population breeding in Transvaal totals at least 30 pairs, and may be found to exceed 100 pairs when results from detailed censussing become available. None are known to nest in any of the conservation areas of the province and the problems associated with conserving a viable breeding population are considerable. The birds are protected by the Nature Conservation Ordinance and thus may not be killed or captured without a permit, nor may the eggs or young be collected or disturbed.

The bird's future here and elsewhere in South Africa really lies in the hands of the sheep- and cattle-farmers on whose properties they live and breed. The landowner's sympathy for these elegant creatures is essential for their continued existence, as only he can effectively safeguard them during their breeding cycle when they are most vulnerable, and prevent veld fires from destroying the eggs or young or herdboys from killing the chicks.

The Crane Study Group was convened by the Southern African Ornithological Society to census all three species of cranes in southern Africa and to collect data concerning their life histories. Its first objective is concerned with the apparent decline of Wattled Cranes and aims at determining how many breeding pairs occur on the subcontinent and then monitoring the stability of the population over several years. The Transvaal Nature Conservation Division is concerned specifically with the conservation of the Wattled Crane in the Transvaal — assessing the size and distribution of the population here and determining what can be done to ensure its continued existence. Accordingly we would welcome any information that may help us in our studies — this may be directed to either the Transvaal Nature Conservation Division or to the Crane Study Group (S.A. Ornithological Society, P.O. Box 87234, Houghton, 2011). □

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PESTICIDES
pose a threat to wildlife

NATURE CONSERVATION DIVISION

LORNA STANTON

Most of us walk unseeing through the world, unaware of its beauties, its wonders, yet, there has been no parallel to the present century's threat to nature. If I may quote Prince Bernhardt of the Netherlands:

"We are dreaming of conquering space. We are already preparing the conquest of the moon. But if we are going to treat other planets as we are treating our own, we had better leave the moon, Mars and Venus strictly alone!

We are poisoning the air over our cities; we are poisoning the rivers and the seas; we are poisoning the soil itself. Some of this may be inevitable. But if we don't get together in a real and mighty effort to stop these attacks upon Mother Earth, where ever possible, we may find ourselves one day — one day soon, maybe — in a world that will be only a desert full of plastic, concrete and electronic robots."

To what extent should we, as South Africans, be alarmed by these words? Let's have a close look at nature and decide for ourselves:

Water, soil and the earth's green mantle of plants make up the world that supports animal life on earth. South Africa is particularly richly endowed with natural beauty and variety.

BUT . . . the history of recent centuries has its black passages. Since 1600 about 130 species of mammals and birds have become extinct . . . they have been lost for ever. In South Africa the Cape lion, quagga and bloubok will never be seen alive again! Obviously their loss cannot be ascribed to pesticide poisoning . . . lead poisoning was a more probable contributing factor!

Excessive hunting, or let's rather call it indiscriminate slaughter, has in the past been considered as one of the most important causes of wild animal extinction in this country. Technology has, however, added a new kind of threat . . . the direct or delayed killing of birds, fishes and mammals, practically every form of wildlife, by chemical pesticides.

The citizen who wishes to make a fair judgement of the question of wildlife loss is today confronted with a dilemma. On the one hand conservationists and many wildlife biologists assert that the losses have been severe and in some cases even catastrophic. On the other hand the control agencies tend to deny flatly and categorically that such losses have occurred, or that they are of any importance if they have. Which view are we to accept?

Proved facts and available evidence should, at least, signal clear warnings to those who, like the priest and the Levite in the biblical story, choose to pass by on the other side and to see nothing. In spite of limited published information on the lethal effects of pesticides on African wildlife species, the following should make even the most unconcerned think twice:

Massive bird mortalities due to pesticide poisoning, involving 6 000 and more birds at a time, have been reported overseas. In the Kruger National Park I have personally seen many birds dying from insecticides sprayed in orchards on adjoining farms. Similar reports have been received from various other sources.

Birds are generally very susceptible to insecticides. A quantity of Aldrin the size of an aspirin tablet is, for instance, enough to kill more than 400 quail, and it should be kept in mind that an estimated 6 000 tons of insecticides are used annually in the Republic, and not always by the most responsible people! Birds which are not killed immediately may be rendered sterile . . . another threat of eventual extinction of rare and vulnerable species.

It should be kept in mind that, under natural conditions, residual pesticides may provide a continuous source of poisoned termites and insects for insectivorous birds and mammals. It was found that as few as 11 earthworms can transfer a lethal dose of DDT to an exotic species of robin.

Earthworms do not only make good fish bait! Together with microscopic mites, primitive wingless insects and other creepy crawlies of the dark underworld, earthworms play an important part in breaking down the residues of plants aiding in the slow conversion of the litter of the forest floor to soil. Earthworms also play a fundamental role as biological agents for the transport of soil. Charles Darwin estimated that many tons of soil per acre are moved by earthworms every year. His cal-

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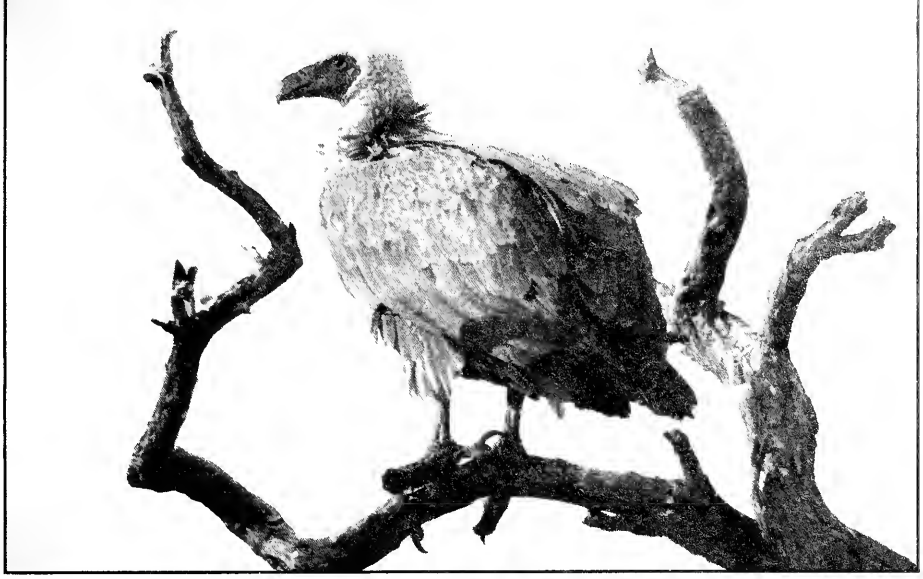

LORNA STANTON

Accumulating pesticide residues threaten all the links in food chains from the insectivores such as spiders and hedgehogs to carrion eaters like vultures

LORNA STANTON

LORNA STANTON

JOHAN VAN JAARSVELD

Birdlife is particularly vulnerable to pesticide poisoning. The White-faced Whistling Ducks (above), Giant Eagle Owl (left), Red-billed Oxpeckers (right) and Crimson-breasted Shrike are all potential victims of this malice.

NATURE CONSERVATION DIVISION

culations showed that the toil of earthworms might add a layer of soil an inch to an inch and a half (2½-4 cm) thick in a ten-year period. Considerable quantities of organic matter, contained in leaves and grass, are drawn into the tunnels and incorporated into the soil which is kept naturally aerated and well drained. Earthworm burrows also aid the penetration of plant roots. The widespread indiscriminate use of insecticides does not only, as can be concluded from what has just been said, pose a threat to insectivorous birds and other larger animal species but it may also adversely affect vital ecological processes at various biological levels.

Some may argue that killed birds have been, are, and always will be successfully replaced by birds invading from adjoining areas. Remaining populations of rare species may, however, be dangerously depleted by repeated spraying and continuous exposure to the effects of residual insecticides.

Mammals may, as a rule, be less dramatically influenced by the widespread use of pesticides. Some of our very rare and endangered species are, however, partially or predominantly insectivorous and may die when feeding on poisoned termites and other insects. These species include the aardwolf, aardvark, pangolin or scaly anteater, hedgehog, night ape, some of the smaller wild cat species and a variety of insectivorous bats.

Recent newspaper reports on the massive release of an insecticide into the Jukskei River were followed up by Dr. Garth Batchelor of our Research Section. His attempts to collect whatever aquatic animal life was available for chemical analysis, proved negative as there was none to be collected.

Fishes are extremely sensitive to various pesticides, including the chlorinated hydrocarbons that make up the bulk of modern insecticides. When thousands of tons of poisonous chemicals are applied to the surface of the land, it is inevitable that some of it will be washed into natural ponds and streams. It has been reported in literature that the massive dumping of insecticides in streams resulted in fish mortalities as far as 200 miles (320 km) downstream. But it is not only the fish that are affected. Natural waters support a variety of wildlife which fits into numerous complex food chains. These chains of life range from the microscopically small green cells of the drifting plant planktons, through the minute water-fleas, to the fishes that strain plankton from the water and are, in turn, eaten by other fishes or by birds such as Fish Eagles and cormorants, or by otters and other animals — an endless transfer from life to life, sometimes with far reaching and disastrous consequences.

Bush encroachment in terrestrial habitats and the excessive accumulation of water hyacinth and certain other aquatic weeds and plants, present serious problems to wildlife managers, which can hardly be solved without the aid of herbicides. Unfortunately the herbicides, like the insecticides, include some dangerous chemicals. Some herbicides may prove relatively safe by oral dosage but can still cause mortalities in animals under field conditions. The careless use of even less toxic herbicides may also have detrimental effects, especially on rare and endangered species. The recent tragic dying-off of many superb *Acacia erioloba* trees, some probably hundreds of years old, along bush cleared roads in the Rustenburg district, prove that the handling and application of herbicides should be done with great care.

Without going into much detail of reported cases of pesticide poisoning, it may be concluded from what has been said, that pesticides can, under certain circumstances, have far reaching and detrimental effects on our indigenous wildlife. There is, however, regrettably still very limited awareness of this potential threat.

Plans of the Transvaal Nature Conservation Division for the future make provision for a large-scale radio and press publicity campaign to warn farmers, gardeners and others against the dangers of the indiscriminate and careless use of pesticides. The general public will also be asked to report all cases of sudden and unexplainable wildlife mortalities in the Transvaal.

The Division will obviously support any legislation aimed at advance investigation of the ecological effects on soil, water and wildlife of new pesticides before these are released for use. We would similarly like to urge responsible government departments to exert even stricter control to prevent the introduction, with imported plants and animals, of new parasite species, thereby avoiding the increased use of pesticides to control new pests.

Anything that destroys the wildlife of an area for even a single year has deprived the bird watcher, the suburbanite who derives joy from birds in his garden, the hunter, the fisherman or the explorer of wild regions of pleasure to which he has a legitimate right. This is a valid point of view. The wildlife tragedy in the countryside involves ethical and aesthetic values and may have a bearing on man's very survival. I would like to conclude by quoting the Duke of Edinburgh:

"Miners use canaries to warn them of deadly gasses. It might not be a bad idea if we take the same warning from the dead birds in our countryside". □

Water hyacinth worries

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W. Scott and P.J. Ashton
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C.S.I.R.

Eichhornia crassipes, more commonly known in South Africa as the water hyacinth, was first recorded on the Cape Flats and in Natal as early as 1908. Probably because of its attractive flowers, it was propagated by man in ponds and dams and only when problems such as the water hyacinth infestation of Hartebeespoort Dam developed, was the threat posed by this plant recognized by the public and the authorities.

Water hyacinth infestations are associated with a variety of problems: water sports such as angling, yachting and waterskiing become almost impossible; normal waterloss by evaporation is aggravated by transpiration from the plant's leaves; additional habitat is created for mosquito larvae and bilharzia snails, and normal flow in waterways is impeded often resulting in unnecessary flooding.

After its first appearance on Hartebeespoort Dam in 1959 the weed was controlled by the Department of Water Affairs using mechanical methods. But in 1971 the dam wall was raised, flooding extensive areas in which mechanical control was made difficult by reedbeds, half-submerged trees and other vegetation and by 1977 the problem was out of hand.

The Department of Water Affairs investigated a variety of mechanical, chemical and biological control methods in 1976. In March 1977 the fastest and most economical method which had been found was tested in a pilot experiment — 20 ha of water hyacinth was sprayed with a chemical control medium. The results of both this trial and a literature review dispelled doubts about extensive deoxygenation and resultant fish mortalities caused by decaying plant material and the decision was taken to apply chemical control measures to the problem.

Spraying would be carried out as soon as the plants became green after the winter of 1977. Changes in the chemical composition of the water and the physical and biological conditions as well as the accumulation of herbicide residues and the actual effect of the spray on the hyacinth would be scientifically monitored before, during and after the programme. The research would represent a combined effort by the Hydrological Research Institute, National Institute for Water Research, South African Bureau of Standards, National Botanical Research Institute and the Transvaal Nature Conservation Division and be partially funded by the Water Research Commission.

Aerial spraying was carried out four times during the summer of 1977/78 and followed up with further spraying from the both banks and the surface of the dam, a phase which became the responsibility of the Nature Conservation Division from April 1978.

Hartebeespoort Dam is now more free of water hyacinth than it has been over the past seven years but a few problems remain to be solved: the broken shoreline provides extensive shelter for remnants of the weed and, as has been experienced at Lake McIlwaine in Zimbabwe, germination of water hyacinth seed is bound to continue for many years to come. As a result, it will be necessary to watch the situation closely in the future.

Provided that the eradication programme can be maintained the sight of drifting water hyacinth on the Hartebeespoort Dam will become just a memory. □

Hartebeespoort Dam now free of water hyacinth infestation. Insets show the problem at its height and the aerial spraying techniques used to treat it.

PHOTOGRAPHS: LORNA STANTON

LORNA STANTON

the pangolin

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The Cape pangolin or scaly anteater belongs to a very small family of mammals which includes only six other species distributed principally through the tropics of Africa and south-eastern Asia. Most of these species are not numerous in any part of their range and this certainly applies to the Cape pangolin whose range extends from the northern Cape Province to the Sudan in the east and to Angola in the west.

Pangolins have an elongated, tapering body covered above and on the sides with large overlapping scales which are attached at the base to the thick skin from which they grow. The head is small and pointed and, on external appearance, they seem to have more in common with pinecones than with mammals. But true mammals they are: they're warm blooded and give birth to live young — usually only one — which they suckle.

The Cape pangolin is mainly an anteater and feeds on a variety of these insects

including many forms, such as army ants, which have a vicious sting. Its odd appearance relates directly to these anteating habits. The eyes are small and protected from insect bites by thick, heavy eyelids. Even the nostrils can be closed to prevent ants from entering them. The animal has no teeth at all but, more appropriately a unique 20 cm long, sticky tongue for flicking into crevices and ant or termite passageways. Very concentrated saliva and gastric juices quickly immobilize and kill the ants which are swallowed before they can cause discomfort by biting and stinging.

The family has both arboreal and terrestrial members but our Cape pangolin is a ground dweller inhabiting mostly savannah country. Emerging in the early evening from its hideout — usually an abandoned springhare or antbear burrow — it will move about rapidly on its two stout hind legs using its extended tail to counter balance it forequarters. The forelegs, which are short and especially equipped for digging with large claws, are held, paws clasped, to the chest. Only the knuckles occasionally touch the ground to stabilize the animal as it walks about in search of food.

If disturbed the pangolin will make for the shelter of a burrow and if unable to do this may curl up into a tight ball with the armoured back, tail and limbs protecting its soft and vulnerable underparts. This defensive behaviour may account for the origin of the name pangolin which is thought to be derived from the Malayan word *guling* meaning a bolster or cylindrical cushion.

Pangolins breed during the summer months and at birth the infant weighs about a quarter of a kilogram — less than a thirtieth of the adult's weight. At first its scales are soft but they harden within two days after which the youngster may leave the burrow with its mother, by clinging to the base of her tail.

At present the Cape pangolin is relatively rare in Southern Africa and whether it ever was more common is doubtful but what is clear is that their numbers have recently decreased. The clearing of more land for agriculture, control of agricultural insect pests and introduction of regular burning programmes have all contributed to reductions in potential pangolin habitat. Biologists will have to learn a lot more about this enigmatic little mammal before specific conservation measures will be possible.

Footnote: Residents of areas where the pangolin occurs are requested to forward information on sightings or other observations which they may have of Cape pangolins. □

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Nylsvley

the nyl's birds

The remarkable floodplain system of the Nyl River is a popular venue for birdwatchers from the Witwatersrand and Pretoria and consequently its *avifauna* has come to be well known. The intention of this account is to introduce the reader to the avian community of this floodplain and to highlight its uniqueness in South Africa. It also considers some of the potential threats to the system and the consequences to the *avifauna* that could be expected if changes to the existing water-regime were implemented.

The Nyl rises in the Waterberg on the farm "Groot Nylsoog", about 10 km north-west of Warmbaths, and flows in a generally north-easterly direction. In the first 20 km of its course it behaves as a conventional river, but from about Kranskop onwards it changes character and over much of the next 60 km it meanders, doubles back on itself, frequently loses its way and in places has no clearly-defined channel. In wet seasons it inundates a broad floodplain and a wide, shallow expanse of water moves slowly downstream. A quirk of geological fate is responsible for this happening: the river which flows off the Waterberg fans out when it reaches the relief-free Springbok Flats, a featureless acacia-plains area formed by the horizontal beds of the Karroo System, basalt and sandstone. At its widest point the floodplain is about six kilometres wide (just south-east of the town of Naboomspruit), and over the total length of the Nyl an area of about 16 200 ha is subject to inundation.

The floodplain is inundated to a greater or lesser extent every year following the summer rains in the catchment area. A grassland area of about 7 800 ha is regularly flooded to some extent each summer and a further 8 400 ha becomes inundated in years of high rainfall (which average once every four to five years). On many of the farms that straddle the Nyl dykes and dams have been constructed which retain some of the floodwater through the year. These provide some permanent water in what would otherwise have been a strictly seasonal aquatic environment. Their effect on the bird-life is marked.

Nearly 400 species of birds have been reliably recorded from the Nyl area by birdwatchers during the past two decades, but only a quarter of these are aquatic species which depend on the Nyl for their livelihood. In all, 93 aquatic species are know to occur. Some are permanent residents along the Nyl, but most are seasonal immigrants and some species are erratic in occurrence and only appear in years of high flood. The latter group is the most exciting one for bird enthusiasts since it includes a number of tropical species, such as the Lesser Gallinule, the Dwarf Bittern and the Rufous-bellied Heron which are seldom seen in South Africa. The Nyl, in fact, provides the only known breeding ground in the country for these three species.

In all, 51 aquatic species are known to breed on the Nyl and a further eight or nine probably do so, but have yet to be confirmed. Thus the Nyl provides a breeding ground for aquatic birds that is probably unrivalled for the diversity that it supports. Breeding occurs to some extent each summer during the rains, but it is in years of high flood that large numbers breed prolifically on the floodplain, and the activity at the large mixed heronries is a spectacular sight. Thirteen heron species breed on the Nyl, most in the mixed heronries, but some, like the Green-backed Heron and Dwarf and Little Bitterns, nest solitarily or in small groups on their own. In wet years the Nyl supports the largest breeding populations known in South Africa. They are: the Great White Heron (about 200 pairs), the Squacco Heron (about 250 pairs) and the Black Heron (40 to 50 pairs), together with great numbers of Night Heron (800 pairs) and Purple Heron (100 pairs). Ten species of ducks and geese breed and at least six members of the rail family. In addition, the Nyl supports four to five breeding pairs of Fish Eagles whose numbers seem to stay constant from year to year, many African Marsh Harriers and fair numbers of breeding and non-breeding migrant waders.

It seems unlikely that the bird-life associated with the Nyl has changed greatly since the arrival of Enslen and his party at the river in 1838. Only one bird, the Saddlebill Stork, has, for reasons unknown, disappeared in recent times as a breeding species from the Nyl. The effect of man on the system has been slight, and has probably had a positive effect on the bird-life, since the dykes and dams have provided permanent water on the floodplain and this has not been at the expense of another aquatic habitat.

What of the future? The Nyl's rich diversity of aquatic birds is a product of the seasonal inundation of the floodplain. The extent to which it is flooded is dependent on the amount of rain which falls within its catchment, and complete inundation may only occur once every four or five years. It is only during complete inundation that many of the 26 species which are partly dependent and all of the 34 species which are wholly dependent on flood conditions breed, and it is only then that the latter group are likely to be found in the area. Thus if, for whatever reason, the floodplain was prevented from ever becoming wholly inundated again, the loss to the *avifauna* would be profound. The 34 species which ▷

DICK WOLFF

Below: The Sacred Ibis is one of 51 aquatic species which live and breed on the Nyl but the Saddlebill Stork (left) has disappeared from the area as a breeding species in recent times.
Overleaf: The Nyl supports a spectrum of fish-eating birds including the Darter seen here at a nest with two young.

WILLIAM MASSYN

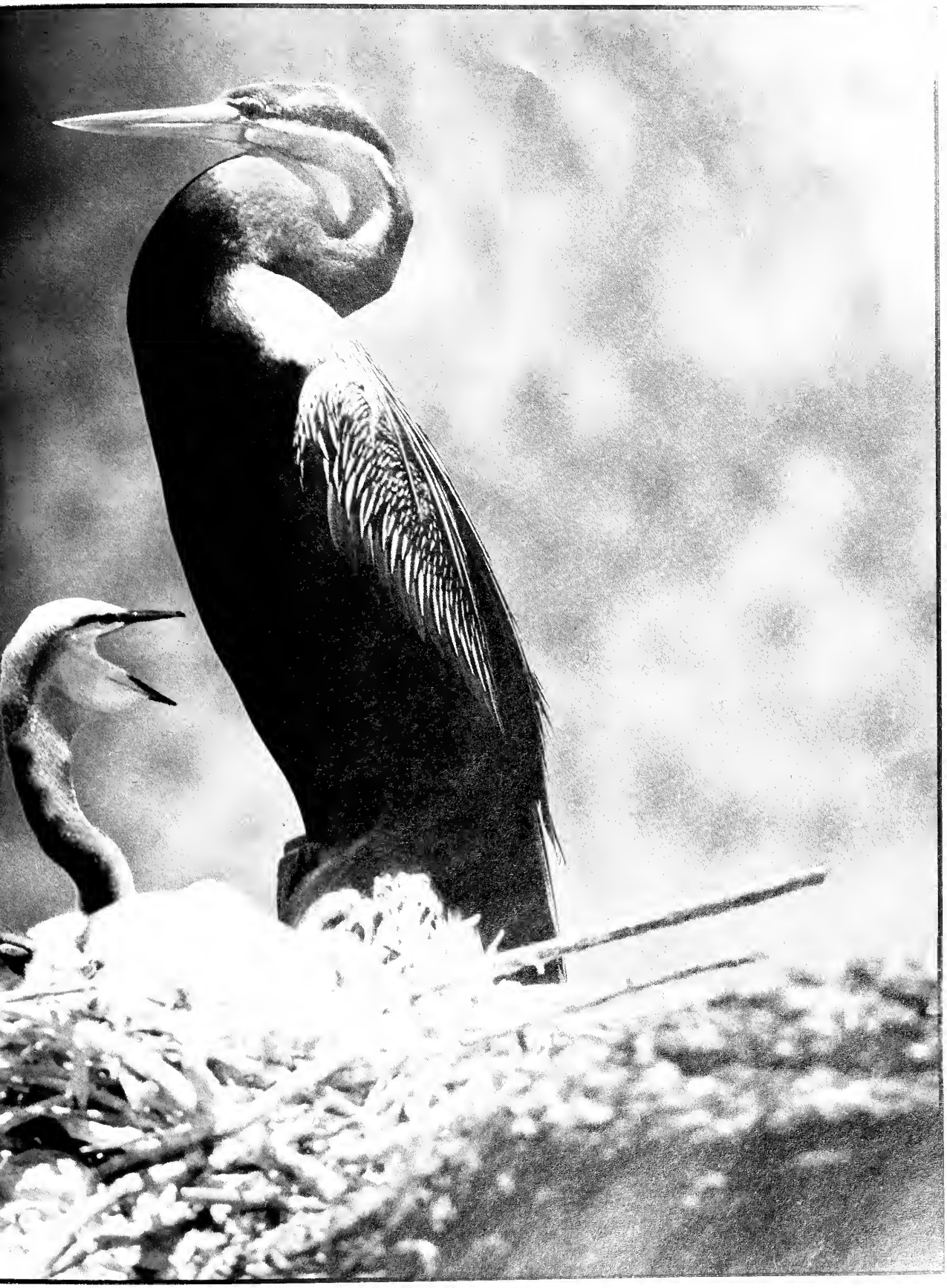
depend on flooding would cease to occur and many of those which are partially dependent would cease to breed here. Three species would be lost as breeding birds to South Africa as a whole (Rufous-bellied Heron, Dwarf Bittern and Lesser Gallinule) and the largest breeding populations in the country of at least three others (Black Heron, Great White Heron, Squacco Heron) would cease to exist. If the Nyl was prevented from partial flooding as well then the number of aquatic birds occurring there would be further reduced from 59 to 33 species and many of these would no longer breed. Thus, before any scheme to divert the Nyl's catchment water became a reality, the benefits of the enterprise would have to be weighed against these losses. As pointed out, these losses in some cases affect the entire South African breeding stock of a species.

Other threats to the system are slight by comparison. Cattle-ranching, the principal form of land-use along the Nyl, has no significant impact on the system or its bird-life. If, however, there was a large-scale shift to intensive agriculture (perhaps rice?) then much aquatic habitat could be lost. Pesticides are a potential hazard since their uncontrolled use in the river's catchment could result in their entering the system and destroying the food-chain. In this respect it is fortunate that the river's catchment area is in hilly country that is used for ranching rather than for crop-growing. However the adjacent Springbok Flats is an intensively cultivated grain-producing region and heavy crop-spraying is standard practice here. Red-billed Queleas are a particular pest-species which are controlled by spraying roosts at night from a low-flying aircraft. If Queleas choose to roost on the Nyl floodplain and the birds were to be sprayed in this way, the toxins used to destroy the birds will simultaneously destroy the aquatic life in the area. This has happened. More serious would be the introduction of persistent pesticides such as DDT and Dieldrin into the system through this type of spraying, and this must be avoided at all costs.

Motorways, along with airports, harbours and the like, are ubiquitous thorns in the sides of environmental conservationists, and the Nyl is not free from this quarter either. The Warmbaths-Naboomspruit link of the N1 motorway has to cross the Nyl somewhere, and two routes have so far been proposed. One traverses the floodplain for seven to eight kilometres, whereas the other cuts it where it is comparatively narrow. This latter route is obviously preferable in terms of the amount of habitat that will be lost and the disturbance that will be caused to bird-life.

Vigilance and public awareness is needed to ensure that this unique ecosystem is not destroyed by inadvertent or intentional interference by man. In particular it is hoped that, should industrial or other interest ever compete for the catchment water which is the life-blood of the system, the decision-makers will place a realistic value on the unique *avifauna* which hangs in the balance. □

LORNA STANTON

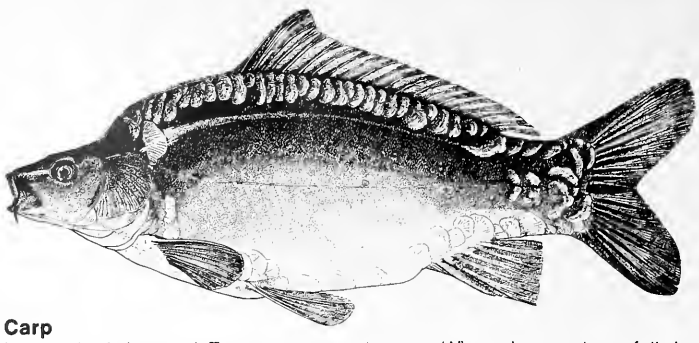


the art of artificial lure angling

Prof. B. J. Engelbrecht
Faculty of Theology
University of Pretoria

Artificial lure angling demands a great amount of ingenuity and craftiness — and if a dash of perseverance is added to this recipe — *Voila!* You are on your way to being a successful artificial lure angler.

As all good cooks must know, the recipe alone does not guarantee perfect results, as intuition, experience and experimentation also have a role to play. With these thoughts, I offer you my "recipes" with which to lure the following freshwater fish to your hooks:

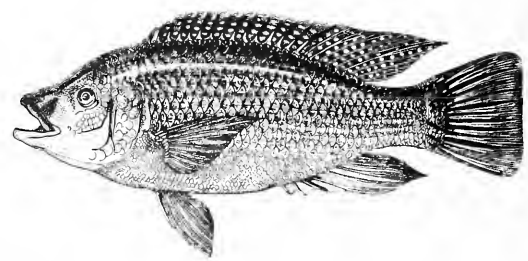


Carp

In certain Asian and European countries the carp, *Cyprinus carpio,* has been bred for centuries. In some areas it is an indispensable source of food. Experts, like Holcik and Mihalik, consider the carp to be the best-known fish in the world. It is also one of the most cautious and most cunning fish — perhaps this can be ascribed to its centuries-long association with its biggest enemy, man.

In practice the carp is not a fish to be caught with artificial bait. I have, however, experimented extensively in catching carp with artificial lures and have indeed caught a few with artificial worms. Two artificial lures which are by far the most successful are the black *Ivens* fly (a No. 6 to 8 hook is recommended) and the well-known black *leadhead* which I design and make myself.

When observed carefully in clear water a carp appears to be standing on its head at an angle while burrowing with his snout into the mud between the roots of waterplants, frequently clouding the water. In doing so waterbugs are often disturbed and when the insects attempt to escape, the carp sucks them in. This explains the angling success of the two artificial baits mentioned. I normally drop the artificial fly about a metre or two on the far side of the carp's feeding ground. I cast the fly (which frequently has a copper-wire around it's body to make it sink), out with a floating line and then allow the fly to sink. After that I slowly retrieve through the spot where the fish is burrowing. When using the *leadhead* I normally move it up and down from the end of a five metre rod. In doing this I



Kurper

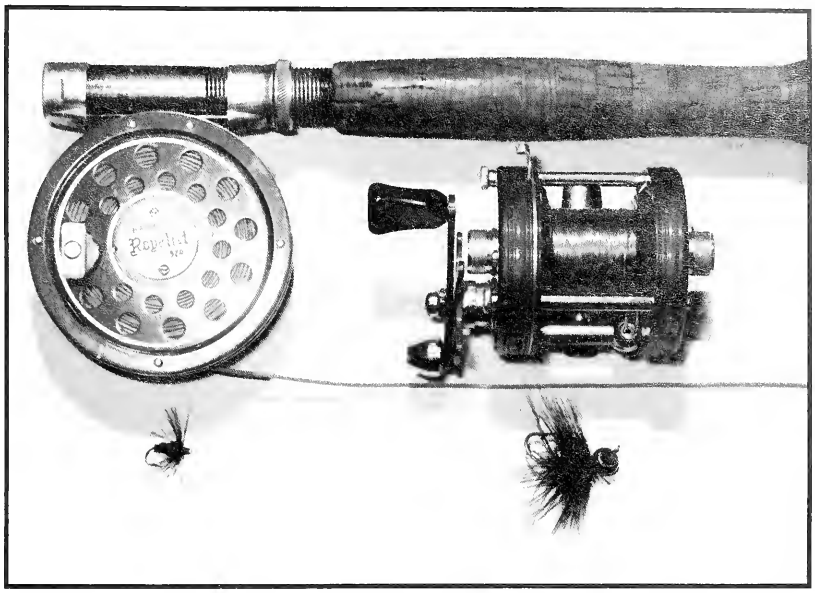
The blue kurper, *Sarotherodon mossambicus,* and the red breasted kurper, *Tilapia rendallii,* are the two best-known angling species of the kurper family. Both these species are well known herbivores and also utilize plankton but after I had caught a red breasted kurper near Belfast with a *Dam Effzet* spoon 25 years ago I subsequently discovered that they also take a variety of insects and especially small fry. This was substantiated by many stomach content analyses and field observations.

I initially experimented a great deal with artificial flies to catch kurper. They often shoal just beneath the surface of the water on windless mornings in spring and autumn. By using a floating line with a fine, tapered leader and being as cautious as when trying to catch a cunning trout, one can hook many kurper with dry flies.

Under windy conditions, however, kurper descend to a deeper level and then it becomes necessary to use a wet fly like the black *Ivens Spider.* A wet fly-line and a small black *leadhead* (jig) are even more effective. Since it is difficult to control the depth of artificial flies and as kurper seem to prefer small fish, I was more successful with small artificial fish. The latter have a twitching action and kurper can thus be caught with even larger artificial minnows, especially if the kurper are not deeper than 0,5 metres. If they are deeper down, faster-sinking artificial lures, such as the spinners, should rather be used. Examples of these are the *Mepps Black Fury No. 2,* a silver *Mepps No. 1,* a *Celta No. 0* and a *Droppen 0.* At the beginning of the season when the live fish on which the kurper prey are small, the small *0* spinner should be

recently broke a South African artificial bait record at Rietvlei Dam near Pretoria. □

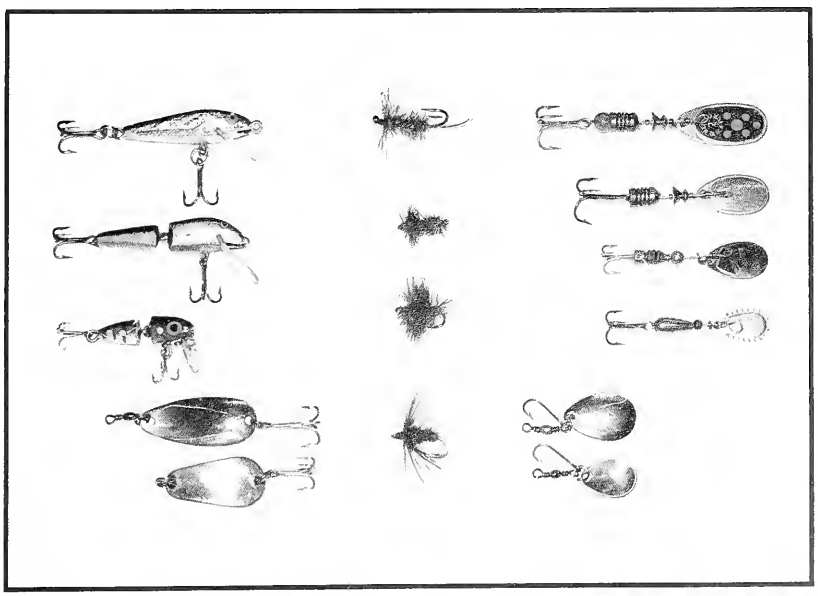
Above: Fly rod with reel and line. Right: Abu 5000 Ambassador reel. Below: Black leadhead and Ivens fly.



used, especially the two *Engelbrecht* spinners, which spin easily and are more efficient when hooking a fish. As the season progresses and the fodder-fish grow in size, it is better to use larger spinners: it is best to use the silver or copper *Mepps 1* first and later the *2* (or even *3) Black Fury*.

As in the case with the two spoons, spinners are effective from the surface of the water to a depth of three to four metres. Spoons are not as effective as spinners, but have the advantage that they do not twist the line when trolling. □

Left: Smallish fat minnow, a medium and a small hinged minnow and a large and a small spoon. Centre: Three dry flies and an Ivens wet fly. Right: Mepps Black Fury No. 2, silver Mepps No. 1, Celta No. 0 and two Engelbrecht spinners.



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the art of artificial lure angling

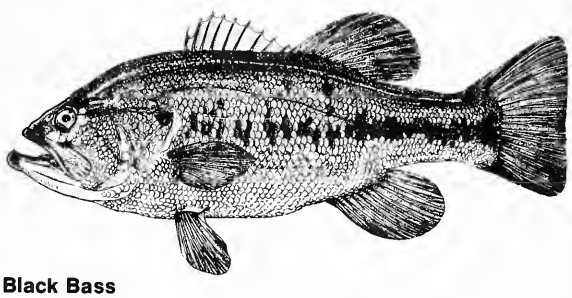
Barbel

Our best-known barbel species is *Clarias gariepinus*. Next to the tiger fish, it is most probably our best indigenous sporting fish for the artificial lure angler. It gave me great pleasure to prove that the barbel is a fine game fish. Although the barbel can be caught with several different artificial lures of various colours, many years' experience has shown that black is by far the best colour with red taking second place.

The black *Spider* or the spoon with the weedless hook can be used to catch barbel, which take refuge under patches of water grass, floating debris or even underneath a layer of algae. The artificial lure and hook are thrown over the grass or shelter and are then slowly retracted. The barbel feels the vibrations, breaks through and grasps the *Spider* in the same way that it would grasp at a mouse running over it, at insects which have fallen into the grass, or at small fish and water insects which have sought shelter under the "roof".

The weedless spoon and the black *leadhead* are mostly used together with a weedless wire. They are fished on a long rod and lowered through the gaps between patches of water-grass, reeds at the water's edge, or through patches of debris, and then slowly moved up and down. This method has enabled me to catch literally hundreds of barbel.

The ordinary black *leadhead,* the black *Fish Mate* spinner, the black *Effzet* spoon, the red sink *Rapala* and the red jointed minnow (which is made of hard plastic), can also be used and can be reeled in relatively fast from almost surface level to deeper levels. Especially when barbels are active in shallow water, more



Black Bass

Two species of black bass are well known to many South African anglers, *viz.* the largemouth bass, *Micropterus salmoides,* and the smallmouth bass, *Micropterus dolomieu*. These fish were introduced from America and because they are predators, they are caught nearly exclusively with artificial lures. Both species are active when the water temperature is about 21°C. During spring, when it remains fairly constant at 15°C, bass come to shallows to breed and eagerly take all types of artificial lures. Angling with artificial lures is favoured because the fish are then within casting distance of the shore. The depth control of artificial lures is not as critical in the shallow water since the fish are extremely aggressive during the breeding season and they easily find and take the bait.

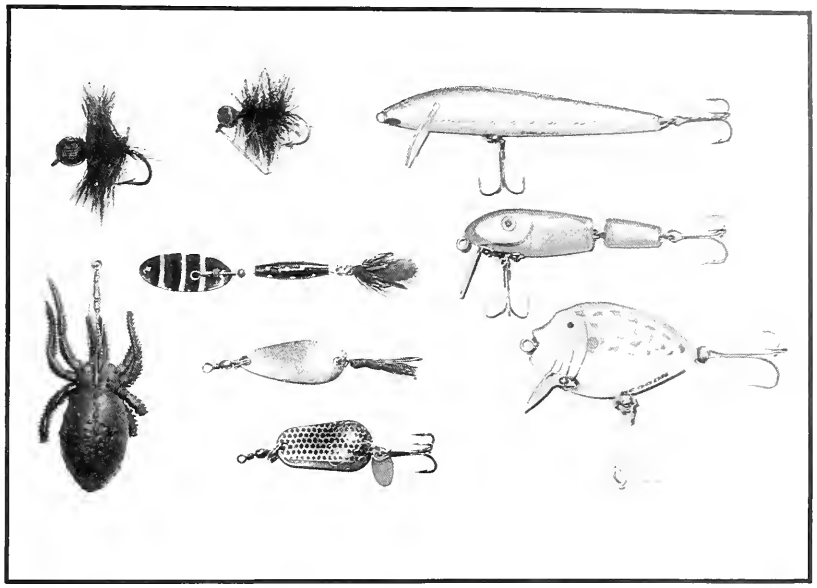
It is a sensational experience to see a black bass grasp a surface lure, such as the *Jitterbug*. This lure must be brought in relatively slowly and must occasionally be allowed to rest. It must then be reeled in faster and more noisily than usual. The *Jitterbug* even works well at night, during mid-summer when the water is warm. (In the summer black bass are too lazy to bite in the daytime.) Excellent artificial baits during spring include the *Big-O* which must be brought in quickly, the *Rapala,* which must be brought in slowly to fairly slowly with regular pauses in between, and the safety-pin type as depicted here by the *Mister Twister* and which is often dressed in plastic strips instead of having the curly-tailed worm. The latter must be reeled in at a medium-to-quick rate. Effective spinners include the *Mepps Black Fury*. In the renowned international "Field and Stream" competition (1977), the *Mepps*-spinner was used by relatively inexpert anglers in the junior division. It is remarkable that more prize-winning fish were caught with this spinner than all the many other artificial baits used. Even in the senior division the *Mepps*-spinner, together with the *leadhead* and *Rapala,* ranked first in popularity.

At the onset of summer black bass seek shelter in deeper waters. Although the artificial lures mentioned (the *Jitterbug,* the *Big-O,* the *Rapala,* the *Mister Twister,* the *Mepps* and other kinds of spinners) still catch bass, the deep runners like the *Deep Six* and other *longlips,* the *leadheads* which are drawn slowly along the bottom and the artificial worms, (especially the weedless which are dragged very slowly along the bottom) are much more efficient.

than fifty a day can be caught by this method. Since barbel are such exciting sporting fish, the true angler would naturally return any surplus fish to the water.

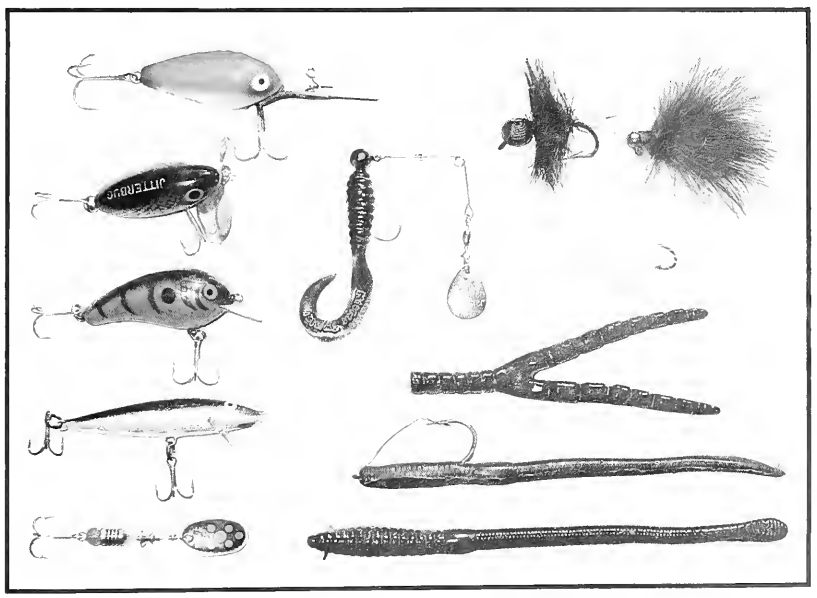
The *Punkinseen*, and sometimes the sink *Rapala*, are mostly used when seeking barbel hiding under dead trees in the water which are used by waterfowl. The boat is brought to a standstill quite a distance from the tree, the *Punkinseed* is cast in next to the tree trunk and left to settle. Normally the barbel takes the artificial bait before it has settled or as soon as it is reeled in. □

Left: Engelbrecht black leadhead and a black spider. Centre: Black leadhead with weedless hook, black Fish Mate spinner, weedless spoon and black Effzett spoon. Right: Large red sink Rapala, red hinged minnow and Punkinseed.



In agreement with many internationally-known angling writers, Homer Circle and master angler, Bill Dance, are quoted as follows about the plastic worm: "Of all the lures since the beginning of artificial lure making, this is the all-time deadly one for bass". I agree. The most successful types of artificial lure used by American professional black bass anglers (in competitions where an angler can win up to 25 000 dollars in one tournament) are the following four: the plastic worm, the *leadhead*, the safety-pin type (like the *Mister Twister)* and the pot-bellied type (like the *Big-O)*. □

Left: Deep Six, Jitterbug, Big-O, Rapala and Mepps Black Fury No. 2. Centre: Mister Twister. Right: Black and purple and white leadheads, two legged plastic worm, plastic worm with weedless hook and red plastic worm.



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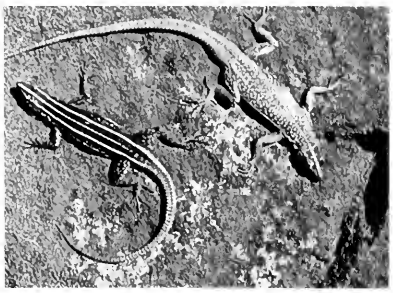
children of the sun



NIELS JACOBSEN

Niels Jacobsen
Senior Professional Officer
Transvaal Nature Conservation Division
Pretoria

Below: Platysaurus relictus *male.*
Above: Mature male Platsaurus *lizards can be distinguished from other members of the species by their brighter colouration and red tails.*
Right: P. guttatus minor *male.*

NEILS JACOBSEN

NIELS JACOBSEN

The *fauna* of South Africa is richly endowed with lizard species, some of which are endemic to the southern subcontinent. They display a variation of form and colour possibly unequalled in the world. Lizards are "cold blooded" animals, which does not mean that their blood is cold, but rather that they do not have a thermo-regulatory mechanism by which energy is expended to maintain a constant body warmth in spite of the temperature of their surroundings. They therefore have to rely on the sun for heat before they can become active. On cold days lizards are inactive and during winter they hibernate, while in summer they move about in the sun and seek shade when they become too hot. This "shuttle" behaviour then is the mechanism by which they are able to be active.

Amongst the most brightly coloured and interesting lizards are those of the genus *Platysaurus* or flat rock lizards. These lizards, of which there are about 20 species and sub-species, are distributed from Malawi and Maputo in the north to the northern Cape Province in the south.

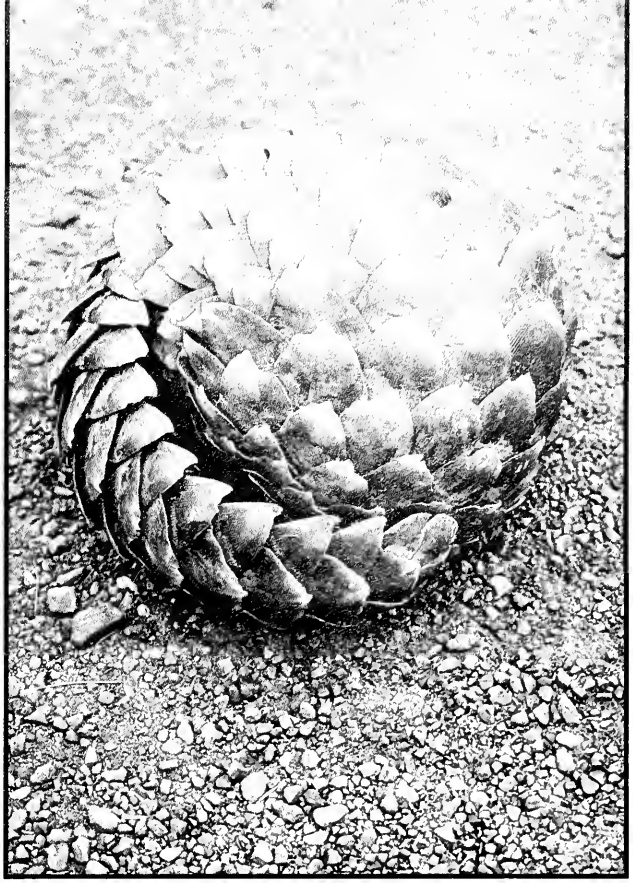
In the Transvaal we have about eight species and sub-species. They are widely distributed although some species have a relatively restricted range, for example *Platysaurus i. rhodesianus,* which only occurs in the arid area north of the Soutpansberg; another, *P. i. parvus,* is restricted to the Blouberg, while *P. relictus* is only found along the western Soutpansberg. More widely distributed is *P. i. intermedius,* which occurs along the eastern Soutpansberg and again on the mountains around Woodbush. *Platysaurus guttatus minor* is found in the Waterberg while *P. g. guttatus* occurs in the Waterberg and in the east along the Transvaal Drakensberg where they may be seen adorning the rocks at the Bourke's Luck Potholes. *Platysaurus fitzsimonsi* has only been found in the Sekukuni mountains near Lydenburg while *P. intermedius wilhelmi* occurs in the lowveld of the southern Kruger National Park and further south along the Lebombo Mountains.

These lizards are unique as they are specially adapted to living on rocky outcrops and especially on large sheets of bedrock, hence the very depressed or flat body shape. This allows them to slip into rock crevices as little as five millimetres wide, although some of the larger species may require cracks somewhat wider. These crevices are usually on a horizontal plane but vertical cracks may also be used. They forage and bask on the rocks surrounding their homes and are extremely alert, especially for aerial predators. When basking they lie flat, pressed to the rock surface in order to absorb the warmth of the sun. The males are very brightly coloured, mostly in varying shades of green above with an orange tail, while the undersurface can vary from blue-green to azure and dark-blue while in some species the belly may even be black. The females, juveniles and immature males are very much duller. They are usually a dull-grey or brownish-black above, and have up to three dorsal longitudinal stripes with or without brownish-white spots in the intervening spaces on the back.

The males appear to be territorial and have a number of females, juveniles and immature males living in the same area. These dominant males are exceptionally brightly-coloured and pose on the rocks with head and body raised off the surface so as to show off their bright and imposing appearance in order to deter other equally bright and dominant males from encroaching on their areas. As they stand on their rocks and survey the area about them they tend to become even more brightly coloured and the vividness may increase in intensity when another dominant male is seen. They can rightly take their place amongst the jewels of the animal kingdom.

These lizards are swift-running and forage over the rocks in short, swift dashes, snapping up their prey. Even when the rocks almost burn the skin of one's hand, these lizards may still be seen flitting about. Their food is mainly invertebrates, especially ants, beetles and insect larvae, while two species feed largely on flower petals, young leaves and seeds. Flat lizards are oviparous (egg-laying) and two eggs are laid at a time in crevices between rocks. Several clutches may be laid during the season, which is usually in spring. On occasion several females may lay in the same spot and up to 26 eggs have been found together. The embryos hatch in midsummer and they become sexually mature at about their second or third year of age.

It is sad to relate that these lizards, because of their bright colours, are being illegally exported overseas where they are in demand in the pet trade. Large numbers of them especially males, have found their way to Europe and America, where the majority perish, sometimes even on the way because of lack of food and water. It will indeed be a sad day when one cannot see these lizards dashing across the rocks, bobbing their heads up and down and flashing their colours in the heat of the morning light. They truly have the right to be called the children of the sun. □



LORNA STANTON

The armoured defence posture of the Cape Pangolin has enabled it to contend with natural predation over the ages but what defence can the species offer against man's unremitting destruction of its habitat?

LORNA STANTON

fauna & flora · 37

Transvaal Nature Conservation Division

WILDLIFE RESEARCH
in the Transvaal

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March 1980

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Index

The lions of Klaserie ... 4
Suikerbosrand's cheetah success story ... 4
Foxing the jackal ... 4
Hope for the wild dog ... 6
Pretoria University on the trail of the wolf ... 6
Where have all the carcasses gone? ... 6
The elephants of Klaserie ... 8
Baby elephant walk . . . monitored ... 8
The oribi — beautiful but endangered ... 8
Game farming ... 8
Big game hunting ... 10
Trophies on the shelf ... 10
Baboon research ... 10
Fruit-bats go crazy for litchis! ... 10
Diseases of wild dogs and jackals ... 10
African swine fever ... 10
Handle these cats with care! ... 10
Special food for healthy antelope ... 12
Modernising game capture ... 12
Treatment of overstraining disease ... 12
Unique South African birds ... 14
Special protection for the birds of the Magaliesberg ... 14
Birds of prey threatened with extinction ... 14
Research focussed on yellow bills ... 14
Duck hybrids under the magnifying glass ... 14
Habitat preferences of terrestrial gamebirds ... 14
Family matters of guineafowl and francolin ... 16
Our rare fishes — a challenging problem ... 16
To catch a tiger ... 16
A most unusual bigmouth! ... 16
Better use of irrigation water ... 16
Intensive carp production in small dams ... 16
Fish production on a cattle farm ... 17
Bream on the menu ... 17
The effect of fish farming on water quality ... 18
Freshwater prawns ... 18
Cold-blooded creatures of the Transvaal ... 18
The role of reptiles and amphibians in nature ... 18
The frogs of Suikerbosrand ... 18
Strange music ... 18
Frog genetics ... 18
The butterflies of Suikerbosrand ... 20
Agriculturalists interested in spiders ... 20
Baboons with problems ... 20
Cave conservation ... 20
Re-evaluating plant conservation ... 20
Special reserves for endangered plants ... 20
Flora of the Blyderivierspoort Nature Reserve ... 22
Flora of the Witwatersrand ... 22
A scientific approach to kareebome ... 22
Birds and mistletoe ... 22
Wetlands must be protected for water-birds ... 22
Imported fish to solve anglers' problems ... 22
Fallow fields interest students ... 24
Pretty but unpalatable ... 24
Bankrotbos causes problems ... 24
Green leaves or old twigs? ... 24
Bird's-eye view of some Eastern Transvaal nature reserves ... 24
Veld management in provincial nature reserves ... 26
Mapping vegetation in the Lowveld ... 26
Water for game ... 26
Tight lines! ... 26

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Nature conservation is applied ecology. For conservation to succeed, we must ensure that it is based on sound ecological principles. This requires the continuous study of nature in all her countless facets — often incomprehensible but always very complicated. Nobody can ever claim to have found the final answer.

Man will never enjoy the privilege of understanding all nature's secrets, and those who delve into these secrets are often overcome with reverence and humility before the miracle of creation.

Research is not a commodity which can be bought for cash. It is an investment in knowledge which can only be built up over generations. In this publication you will read about a large number of projects, each of which is intended to contribute, directly or indirectly, to the success of nature conservation.

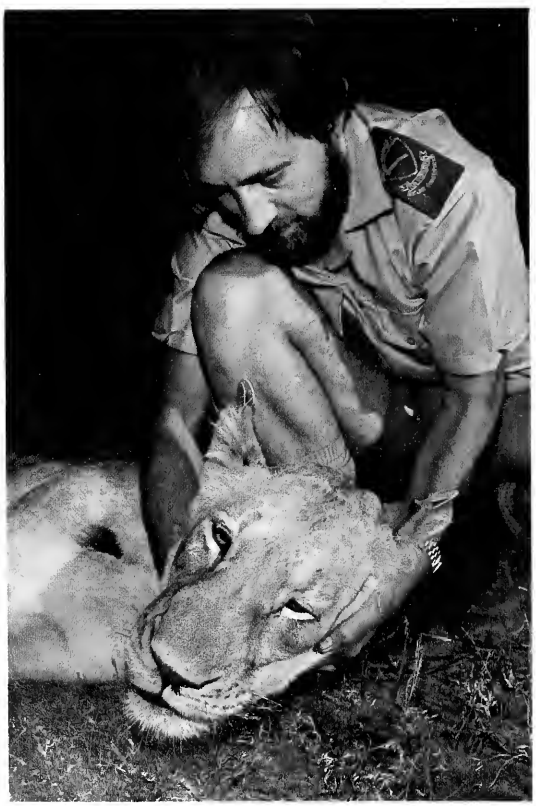
S.S. du Plessis
DIRECTOR OF NATURE CONSERVATION

Lorna Stanton

The lions of Klaserie

Lions are still found in significant numbers in private nature reserves outside the Kruger National Park. The Klaserie Private Nature Reserve, north-west of the Park's Orpen gate, is one example. This reserve, 30 km long and 25 km wide, contains 22 000 larger mammals, including approximately 250 buffalo, 3 000 wildebeest, 2 000 zebra, 1 600 giraffe and 15 000 impala. It is in this magnificent natural area that messrs Petri Viljoen and Nick Zambatis sacrifice their sleep in order to capture lions and fit them with neckbands and radio-transmitters. The marked lions are subsequently observed over a period of several months. This enables the researchers to gather valuable information about the lions' population size, their movements and hunting habits, and their general behaviour patterns. The information so obtained will be made available to the 109 owners of Klaserie, who are responsible for maintaining the delicate balance between the various predators and their prey species in the reserve.

Lions outside of the Kruger Park are also being studied intensively.



Lorna Stanton

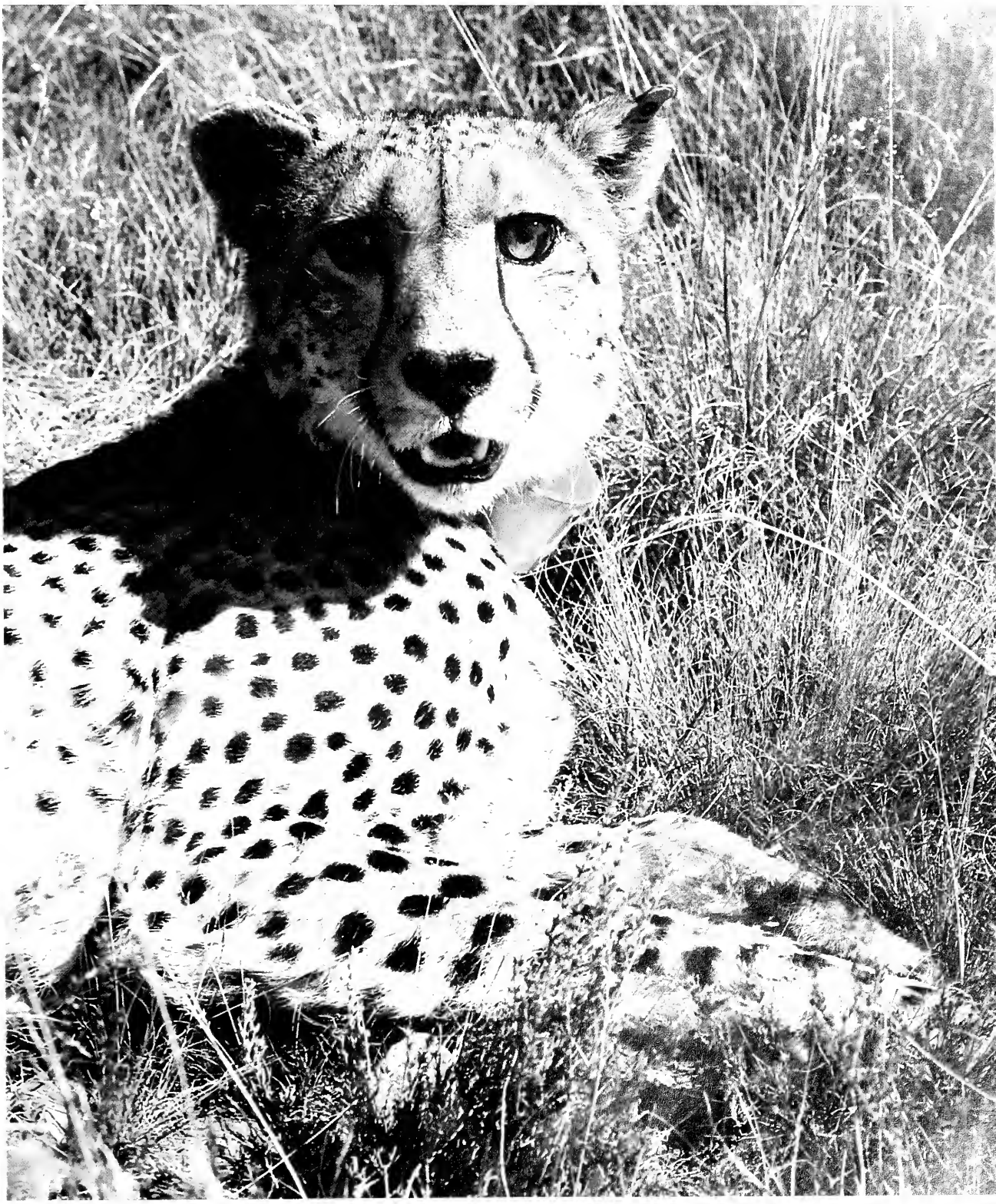
Suikerbosrand's cheetah success story

The cheetahs of the Suikerbosrand Provincial Nature Reserve are rewarding efforts to save them from extinction. The Transvaal Nature Conservation Division captured wild cheetahs on farms in the province where they were in danger of being shot, and released them into this beautiful reserve near Heidelberg. Approximately 900 blesbuck and other herbivores in Suikerbosrand were to serve as possible prey animals for these cheetahs. The cheetahs have more than trebled their numbers over the past few years, while the antelope populations have been held in check in a natural manner. Mr Howard Pettifer and his staff are studying these elusive cats, using night-viewing scopes and radio-tracking devices to keep a round-the-clock record of their whereabouts. Surplus cheetahs from the reserve were recently distributed to the Eastern Shores Nature Reserve in Natal and the Rolfontein Nature Reserve in the Cape, where they live under natural conditions. In this way they can play their part in the preservation of the world's fastest land animal.

Foxing the jackal!

The black-backed jackal, one of the craftiest members of the animal kingdom, is ruthlessly hunted and killed outside the larger game reserves. The indiscriminate use of poison by some farmers in an attempt to reduce the numbers of this animal is unfortunately responsible for large-scale mortalities amongst other predators. This includes the rarer species such as the bat-eared fox and the aardwolf, both of which play an important role in the natural control of termites and other insect pests. Their lives, as well as those of other useful and harmless small predators, are threatened by the misuse of poisoned baits. Mr Willem Ferguson and his staff have set themselves the difficult task of measuring their ingenuity against that of the jackal. Sophisticated electronic equipment is used to monitor the activities of marked animals, and aeroplanes fitted with radio-tracking devices are sometimes used to trace animals which have left the study area.

A cheetah marked with a radio transmitter can be traced over a distance of 12 kilometres. With the aid of radio-telemetry it has been established that a cheetah can move up to 30 kilometres per day.



Lorna Stanton

Hope for the wild dog

The wild dog is even rarer than the cheetah, and this interesting carnivore faces a decidedly more uncertain future than most other endangered species in South Africa. The Transvaal Nature Conservation Division's research and conservation programmes provide for the capture of wild dogs on Northern and Eastern Transvaal farms, where they run the risk of being shot by landowners. At the same time, the Division assists the National Zoological Gardens in Pretoria, the Johannesburg Zoo and the De Wildt Breeding Station near Pretoria, in their attempts to breed wild dogs in captivity. It is anticipated that large numbers of wild dogs will be bred in captivity for eventual re-introduction into the wild. Adult dogs, caught in problem areas, will be released with young dogs born in captivity. The precarious status of the wild dog in the Eastern Transvaal should be strengthened in this way. It is hoped that, in co-operation with the National Parks Board, reasonable numbers of wild dogs can also be re-established in the beautiful Kalahari Gemsbok National Park, where only a few dogs survive. It was accepted at one stage that wild dogs had already died out in this reserve.

Pretoria University on the trail of the wolf

Transvaal bushveld farmers know the brown hyaena as the "wolf". Professor John Skinner and his team from the Mammal Research Institute at the University of Pretoria have been paying special attention over the past few years to this mysterious nocturnal animal. The brown hyaena possesses more powerful jaws than most other carnivores, enabling it to function as one of Nature's most efficient scavengers. It seldom catches large prey, and has survived for decades on farms where no proof of its predation on farm animals has yet been found. The ecology of this interesting species is being studied on the Rustenburg Provincial Nature Reserve.

Where have all the carcasses gone?

Animal carcasses can act as dangerous carriers of disease, and should be removed from the veld and destroyed as soon as possible. At the same time, however, these carcasses serve as an important food source for scavengers such as hyaenas and vultures. The significant role played by scavengers in the efficient removal of dead animal matter in the wild is not always appreciated. This vital ecological aspect is being studied by Mr Philip Richardson of the McGregor Museum in Kimberley, who is undertaking part of his research in Transvaal provincial nature reserves.

The brown hyaena deserves special protection on farms by virtue of its contribution to the removal of disease-infected carcasses.

Rudi van Aarde

Intensive research and active attempts to relocate wild dogs in safer areas may result in the rescue of a dying species.

Lorna Stanton

The elephants of Klaserie

A breeding herd of elephants still inhabits the Klaserie Private Nature Reserve, where their numbers already exceed the 100-mark. An adult elephant can consume over a hundred kilograms of vegetation per day, and this largest of land mammals consequently fulfills an extremely important role in nature. The activities of the Klaserie elephants are being studied by Prof. Koos Bothma of the University of Pretoria, the Endangered Wildlife Trust and the Transvaal Nature Conservation Division, in order to evaluate their impact on available natural resources.

Baby elephant walk . . . monitored

Bush encroachment in the Sabi Sand Wildtuin made the owners decide to supplement the small local population of elephant bulls with young female elephants from the Kruger National Park. It is hoped that a successful breeding herd can be established in this manner, which could later contribute to the natural removal of surplus bushy vegetation. Dr Neil Fairall of the University of Pretoria is studying the successful relocation of these young elephants in the Sabi Sand Wildtuin.

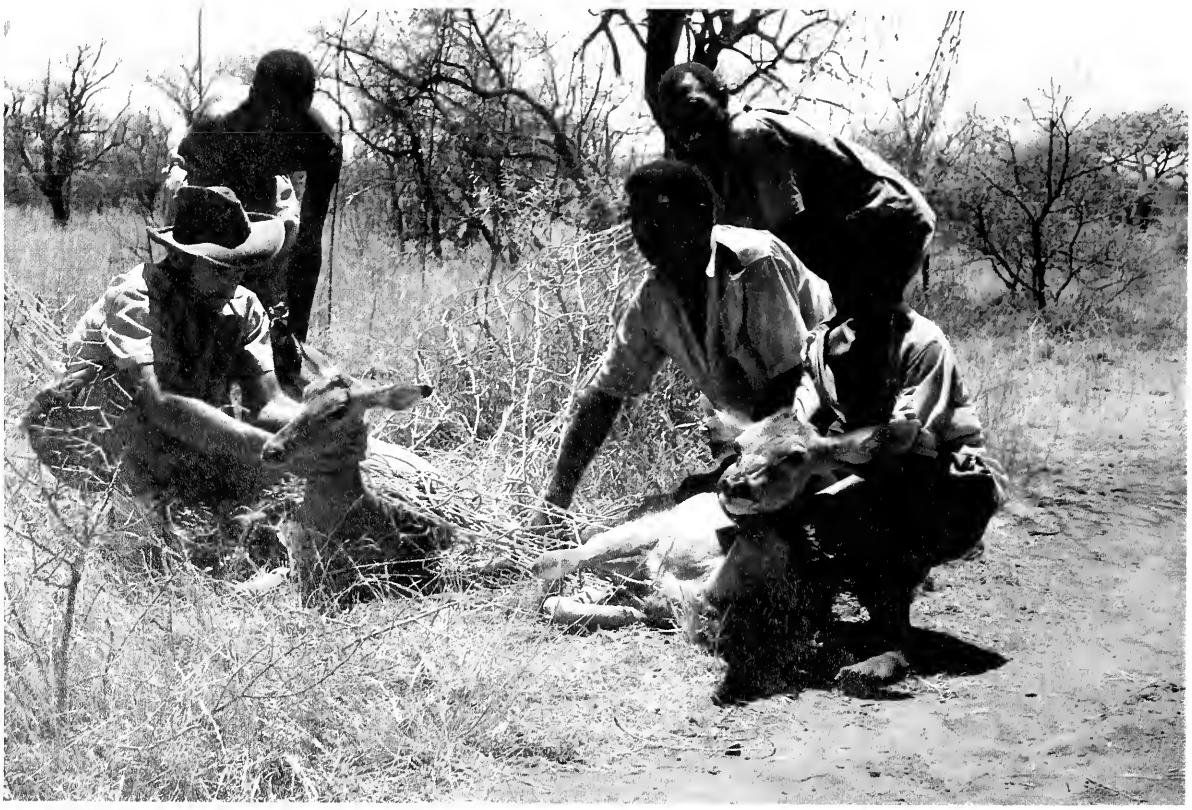
The oribi — beautiful but endangered

Man's encroachment on nature is threatening many forms of wildlife, and even the beautiful little oribi cannot escape the danger. Mr Petri Viljoen, who has studied the oribi over the past few years, has found several factors which pose threats to the survival of this dainty antelope. These include the large-scale replacement of natural grasslands by plantations of exotic trees on the Eastern Transvaal escarpment, and expanding agricultural activities. More than one hundred oribi have already been captured in areas where their future existence was threatened. They have been released into the Kruger National Park and the Rustenburg and Suikerbosrand Provincial Nature Reserves.

Game farming

The utilisation of game on farms has mushroomed overnight into an extremely profitable business enterprise. Venison worth several million rands is exported annually, while the demand for hunting and tourist facilities on game farms in certain areas is expected to increase steadily. Mr Barrie Koch of the Transvaal Nature Conservation Division is studying the commercial utilisation of surplus game on private farms in the Transvaal.

Research can contribute to the better utilisation of game animals on farms.



Eddie Young

Elephants fulfil important tasks in nature. Excessive plant growth is converted on a large scale into much-needed soil fertilisers, and water is made available to other wild animals when pits are dug and left in sandy riverbeds.

Lorna Stanton

Big game hunting

Foreign hunters are showing a lively and increasing interest in South African hunting grounds. Mr W.K. Kettlitz of the Nature Conservation Division is investigating the hunting situation in the Transvaal with a two-fold aim — to enable the Division to exercise effective control, and to provide game farmers with all the necessary information. He will weigh up the requirements of hunters against facilities and services offered by game farmers and safari companies. His recommendations should lead to an improvement in hunting conditions in the Transvaal.

Trophies on the shelf

The Wildlife Society, like other conservation organisations, is concerned about the extent of the trade in animal products, such as the skins of cheetahs and other rare species. Consequently, Mr Mike Landman has undertaken a survey to ascertain whether the trade in game trophies could possibly contribute to the rarity of endangered species. His recommendations are expected to contribute towards stricter control over the trophy trade and the consequent better protection of endangered animals.

Baboon research

Ms Connie Anderson of the University of California is interested in the social behaviour of the Suikerbosrand baboon population. The baboons' ranging patterns and the interaction between members of neighbouring troops are receiving special attention, in order to complete a comparative study of baboon behaviour initiated elsewhere in Africa.

Fruit-bats go crazy for litchis!

After receiving complaints from farmers in the Tzaneen area of the Eastern Transvaal that fruit-bats were wreaking havoc in their litchi orchards, Mr Niels Jacobsen of the Transvaal Nature Conservation Division investigated the situation. He fitted miniature radio transmitters and ring markers to captured bats to establish where the large numbers of bats originated, and in this way located their breeding cave in Lebowa. Some of the marked bats were later observed hundreds of kilometres away in the St. Lucia area of Natal.

Diseases of wild dogs and jackals

It has been maintained for decades that contagious diseases are to a great extent responsible for the rarity of wild dogs in the Kruger National Park and adjacent private nature reserves. Dr Joseph van Heerden of the Onderstepoort Faculty of Veterinary Science has undertaken experimental research on the influence of known canine diseases on the wild dog and black-backed jackal. Effective preventative methods of treatment are also being investigated.

African swine fever

Dr Gavin Thomson of the Veterinary Research Institute at Onderstepoort is investigating the role played by warthogs in the maintenance of African swine fever, and its transmission to domestic pigs. His preliminary results indicate that this virus is most actively transmitted between its free-living hosts during the summer, and that young warthogs are a more important source of the virus than adults. Outbreaks of this fatal disease of domestic pigs can be effectively prevented by efficient pig farm management.

Handle these cats with care!

For many years veterinarians and other researchers have been paying attention to the handling of cheetah in captivity. The treatment of a variety of diseases to which these animals are susceptible, has also been improved. Specialised research on effective dart-drugging techniques and the proper management of cheetah prior to their release into the wild, now form part of Dr W. Swart's study programme. He is also paying attention to the blood-physiology of the cheetah and the effects of different immunisation techniques on the immune status of captive cheetah. Research on cheetah in the Transvaal is co-ordinated by a cheetah study group of 30 members, all actively involved in cheetah research, and functioning under the auspices of the Transvaal Nature Conservation Division. The Division is convinced that joint research by zoologists, veterinarians and other scientists is the best approach to solving problems relating to the protection of rare and endangered species. Co-operation of this nature is consequently encouraged, and universities and other research organisations are regularly invited to participate in joint research projects.

The Transvaal Nature Conservation Division encourages co-operative research. Thirty researchers studying different aspects of cheetah behaviour, ecology and management have regular research meetings to discuss and compare their findings.

Lorna Stanton

Niels Jacobsen

Fruit-bats marked in litchi orchards near Tzaneen in the Eastern Transvaal were later found hundreds of kilometres away, near St Lucia in Natal.

Special food for healthy antelope

Research undertaken by Onderstepoort has shown that, in parts of South Africa where mineral deficiencies are found in the grazing, cattle and sheep suffer from various deficiency diseases such as anaemia. Low lambing and calving rates, increased susceptibility to disease, and certain other illnesses may also occur in such animals. A selenium deficiency in the grazing, for example, can result in muscular degeneration in domestic stock. This illness resembles overstraining disease, a physiological disturbance sometimes found in newly-caught game animals. The fencing-in of game in relatively small reserves and game farms may deprive such animals of their former access to the necessary nutrients in various grazing areas during different seasons. Supplementary feeding may be indicated, especially in the case of rare species such as the roan antelope, sable antelope and tsessebe. In order to tackle a supplementary feeding programme in a scientific manner, Dr Toni Harthoorn of the Transvaal Nature Conservation Division is doing research to determine putative deficiencies in the various provincial nature reserves, and to assess the need for supplementation.

Modernising game capture

For several years South Africa has led the field in developing and perfecting game capture techniques. Dr Toni Harthoorn's latest approach includes the use of permanently erected capture pens. The game is lured into these pens, with either food or water. The animals are then made to run through a capture "funnel" and corridor, to accustom them to the structure and to increase their fitness. They should consequently be less likely to succumb to overstraining disease when eventually captured.

Treatment of overstraining disease

Overstraining disease is a physiological disturbance of wild animals subjected to excessive fear and overexertion during and after capture. This disease has already been diagnosed in over twenty different animal species, and is characterised by muscle and heart lesions and degeneration of various other organs. Affected animals may become paralysed or die from heart failure. Although the prevention of overstraining represents the most important part of treatment, it is still sometimes necessary to treat exhausted wild animals therapeutically. Dr Toni Harthoorn and his fellow researchers are testing various methods of treatment.

Overstraining disease has already been responsible for deaths among animals of over twenty different species. Research is aimed at the prevention of this disease during and after capture operations.

W. Massyn

Unique South African birds

The Highveld region of South Africa is the home of a number of bird species which are found nowhere else in the world. This places a special responsibility on the Transvaal Nature Conservation Division to find out as much as possible about these species, and then to grant them adequate protection. Mr Warwick Tarboton of the Division is paying special attention in this connection to species such as the blue korhaan, Botha's lark, Rudd's lark and the yellow-breasted pipit.

Special protection for the birds of the Magaliesberg

Approximately 130 kilometres of the beautiful Magaliesberg mountain range, between Pretoria and Rustenburg, has been proclaimed a "natural area" under the Environmental Planning Act of 1967. Various rare species of birds still inhabit this rugged terrain, with its impressive cliff-faces and heavily-wooded kloofs. Members of the Witwatersrand Bird Club and the Northern Transvaal Ornithological Society, under the guidance of Mr Warwick Tarboton, are busy with a comprehensive survey of the birds of this important conservation area.

Birds of prey threatened with extinction

Eighteen of the 62 species of birds of prey found in the Transvaal are listed in the Red Data Book as rare or endangered birds. Many farmers wage war on these raptors without being aware of their rarity, and eagles, hawks, owls, falcons and other birds of prey are shot on sight. Poisoned carcasses are laid as bait for leopards, caracals and jackals. These baits are a serious threat to scavenging raptors such as the bateleur eagle, and are largely responsible for the disappearance of vultures from areas which they frequented until recently. Mr Warwick Tarboton of the Transvaal Nature Conservation Division will soon complete the first phase of his survey of the Transvaal birds of prey, and it is hoped that his report will make more people aware of the dangers of disturbing the fragile balance of nature.

Research focussed on yellow bills

Bird hunters are showing an increasing interest in the hunting of aquatic birds, and it is therefore necessary to have sufficient knowledge of these birds' breeding seasons, breeding rates, migratory patterns and habitat requirements. Mr Dave Skead and his staff of the Barberspan Ornithological Research Station are presently doing intensive research on the yellow-billed duck. They observe these ducks from dawn till dusk in order to find out as much as possible about their feeding habits, social behaviour and general living requirements. With such information available, the necessary regulations covering hunting seasons and quotas can be made to ensure the best possible control over bird hunting.

Duck hybrids under the magnifying glass

Crossbreeding occurs sporadically amongst wild bird species. The laws of nature usually prevent any deviation from purebreeding within a particular species. Hybridisation consequently takes place mainly under artificial conditions, where birds of different species are held captive together for prolonged periods of time. Mr Johan Combrinck of the University of Pretoria is using sophisticated techniques, such as chromosome analyses, to study the genetic relationships of ducks and duck hybrids.

Habitat preferences of terrestrial gamebirds

The demand for hunting opportunities will probably always exceed the supply of gamebirds. Despite the fact that the promotion of hunting is not a priority of the Transvaal Nature Conservation Division, research is nevertheless being undertaken to obtain as much applicable information as possible about gamebirds. Landowners and bird hunters often inquire how they can increase the numbers of terrestrial gamebirds on their farms by using relevant farm management techniques. Mr Siegfried Wolff of the Division is paying special attention in his research project to the preferred habitats of the various guineafowl, francolin and partridge species of the Transvaal. Specific recommendations with regard to gamebird management will be based on his research findings.

Hundreds of private researchers are undertaking a survey of the birds of the Magaliesberg. This project is being conducted under the direction of the Transvaal Nature Conservation Division.

Peter Barichievy

Peter Barichievy

Johan van Jaarsveld

Peter Barichievy

Family matters of guineafowl and francolin

Guineafowl and francolin are hunted on a large scale in the Transvaal. It is therefore important that the Nature Conservation Division of this province, which controls hunting licences, has the required knowledge of the population figures of these species. Mr Siegfried Wolff has developed a special ability to ferret out guineafowl and francolin nests. His recent studies have shown that few of the chicks which hatch out actually reach maturity, and that certain birds do not breed at all during extremely dry seasons.

Our rare fishes — a challenging problem

Twelve of the approximately 70 indigenous fish species inhabiting Transvaal waters are relatively scarce. Five of these face extinction unless the necessary conservation measures are taken in time. Several factors threaten the survival of these fish species, the most dangerous being the pollution of our inland waters. Excessive pumping of river water for agricultural and industrial purposes, and the construction of high weirs in the rivers also place the future of certain fish in jeopardy. The normal movement patterns of fishes such as the tiger-fish and mudfish are restricted by high weirs. The silting-up of rivers in heavily-wooded areas and the invasion of foreign fish species such as the rainbow trout pose further threats. Mr Neels Kleynhans of the Transvaal Nature Conservation Division is doing full-time research on the rare fish species of the Transvaal, and some of his recommendations are already being implemented. The Treur river minnow, one of the rarest fishes in the world, for instance, has recently been reintroduced into areas where it had previously disappeared.

To catch a tiger

Mr Nico van Loggerenberg of the Lydenburg Fisheries Institute is devoting his full attention to the study of the distribution and ecology of one of South Africa's most popular angling fishes — the tiger-fish. Recent surveys have shown increasing numbers of tiger-fish in the Letaba and Olifants rivers. This may have resulted from the construction of a large dam a few years ago near the confluence of these two rivers in Mocambique. Tiger-fish have also been found to be breeding in the Pongolapoort Dam near Pongola. Attempts will be made to breed tiger-fish artificially and then to release young fishes into suitable angling waters. Depending on the success of this project, Transvaal anglers may look forward to a better opportunity of catching a tiger.

A most unusual bigmouth!

The largemouth yellowfish occurs in relatively small numbers in the Vaal river system, and represents a mere 5% of the total fish population. Its existence is threatened by its popularity as an angling fish and the fact that it only reaches sexual maturity after eight years. Other detrimental factors include the increased turbidity of the water in the major rivers and larger dams, and the unnaturally restricted flow of rivers. Various unsuccessful attempts were made over the past ten years to breed the largemouth yellowfish, but a breakthrough was only made last year by Messrs Barrie Koch and Frans van der Merwe of the Transvaal Nature Conservation Division. Over 10 000 largemouth yellowfish were bred artificially by means of hormone treatment of the females, and 3 000 of these have already been released into the Boskop Dam. This breeding achievement will probably lead to the further release of this popular angling fish into suitable waters.

Better use of irrigation water

The unique idea of utilising canal water for fish production before it is used for irrigation purposes, is now being investigated. Water is diverted from existing canal systems into specially designed fish production dams or raceways, in which the fish are reared. With this technique, 16 000 fish have already been successfully reared in a single unit at the Marble Hall Fisheries Research Station of the Transvaal Nature Conservation Division. This specific unit, serving as a study model, yields approximately eight tons of fish per 1 000 cubic metres of water annually. The advantage of this method lies in the fact that the same water can be re-used several times for fish production in a series of dams before its eventual use in crop cultivation. Mr Feltus Brandt of the above-mentioned station is supervising the project, which is financed by the Water Research Commission.

Intensive carp production in small dams

The same principles apply here as in the previous project. In this project, however, also supervised by Mr Feltus Brandt, the water is only used once in a circular dam before being returned to the canal. By this method, approximately one ton of marketable table fish can be produced in an average-sized dam of 25-30 cubic metres. The growing demand for high quality fish for human consumption purposes makes research on intensive fish production very necessary. This function remains one of the Nature Conservation Division's responsibilities.

Fish production on a cattle farm

The routine use of commercial fish foods raises the production costs of table fish to a level where fish farming could become an uneconomical proposition. Mr Riaan Venter of the Lowveld Fisheries Research Station is investigating the possible replacement of expensive fish foods by readily available organic material such as cattle manure. He is also studying the ideal combination of various fish species with different food requirements, which can be kept together in production dams to ensure maximal mass-production.

Bream on the menu

Indigenous fishes such as bream are receiving increasing attention from researchers in the field of intensive fish production. They are also becoming more popular with the consumer. Bream breed very rapidly, and the enormous amount of energy used in breeding results in a very slow weight gain under natural conditions. Mr Feltus Brandt is considering the elimination of one of the two sexes by hormone treatment in his experimental production programme. Research has shown that when certain different species of bream are cross-bred, the offspring are predominantly either male or female. This factor will also be investigated to gain maximum bream production.

Millions of eggs were produced by grass carp which had been artificially treated with hormones.

Lorna Stanton

Lorna Stanton

The effect of fish farming on water quality

Fish farmers have a special responsibility — they must ensure that the water in their production units is purified before it is pumped back into canals or rivers. Different purification processes are therefore being tested to find the most effective method. Messrs Neels Kleynhans and André Coetzee are studying the efficiency of sedimentation dams in the purification of used water. They are conducting their research primarily at the De Kuilen trout breeding station of the Transvaal Nature Conservation Division, where nearly 4 million trout eggs are produced annually. This breeding station also supplies up to 100 000 trout every year for the restocking of suitable angling waters.

Freshwater prawns

Prawns are a major attraction on any seafood menu. Few people, however, are aware of the fact that two edible varieties of prawn are found in our Tranvaal rivers. Prawns are produced commercially overseas, and this unusual farming venture can bring the farmer as much as R8 000 per hectare annually. Mr Feltus Brandt of the Lowveld Fisheries Research Station will soon begin experimenting with the breeding of indigenous prawn species. At the same time, Mr Nico van Loggerenberg of the Lydenburg Fisheries Institute will be studying the ecology of prawns in natural streams.

Cold-blooded creatures of the Transvaal

In the past, snakes, frogs and other reptiles and amphibians probably received too little attention from conservation bodies. At the end of 1978, however, Mr Niels Jacobsen, herpetologist of the Transvaal Nature Conservation Division, started a research project to ascertain the status and distribution of reptiles and amphibians in this province. His research is aimed primarily at the protection of this neglected animal group, with special emphasis on the rarer species.

The role of reptiles and amphibians in nature

Mr Niels Jacobsen is also studying the role and importance of reptiles and amphibians in maintaining the balance of nature. This forms part of the savanna ecosystem project in which several universities and research institutions are participating. This comprehensive research programme is being conducted in the Nylsvley Provincial Nature Reserve, and is unique in the history of nature research in South Africa.

The frogs of Suikerbosrand

Mr Vincent Carruthers, an enthusiastic private researcher and authority on frogs, recently completed a survey of the frog population of the Suikerbosrand Provincial Nature Reserve. He found thirteen different species, and included this information in the book "Frogs of South Africa", published recently and written by Mr Carruthers in collaboration with Dr Neville Passmore.

Strange music

Dr Neville Passmore of the University of the Witwatersrand is studying the communicating calls of frogs. He uses sophisticated sound equipment in his research to record frog sounds, the end result being a series of sound frequencies resembling strange music notes. In the Suikerbosrand Nature Reserve, Dr Passmore is concentrating on the possible use of call-sounds to differentiate between various frog species.

Frog genetics

In the past, animals were classified as different species and sub-species according to their size and general appearance. It is becoming increasingly obvious, however, that more sophisticated methods should be applied to differentiate between closely-related groups. Chromosome analyses, electrophoresis techniques and several other concepts relatively unknown to the layman, have recently been employed as part of this new approach. The sand frog group, whose members appear at first glance to be very similar, receives special attention from Dr Neville Passmore. This research should provide a better understanding of frog evolution. Imagine what the frogs think of this!

This interesting frog, ***Rana grayi,*** *is one of several hundred species of cold-blooded animals being studied by researchers of the Nature Conservation Division.*

Niels Jacobsen

The butterflies of Suikerbosrand

Dr D.M. Kroon is another enthusiastic private researcher and an authority on Lepidoptera. He is studying the various species of butterflies and moths in the Suikerbosrand Nature Reserve, and his research has yielded approximately 330 species to date. An interesting fact is that one particular butterfly, *Poecilmitis aureus,* is found only in the surroundings of this reserve, and nowhere else in the world.

Agriculturalists interested in spiders

Mrs Ansie Dippenaar of the Department of Agricultural Technical Services is studying arachnids, particularly the *Araneae,* of the Roodeplaatdam and Rustenburg Provincial Nature Reserves. The different approaches to research and comprehensive investigations undertaken in these reserves should result in their becoming important field laboratories for nearby universities and colleges.

Baboons with problems

Research by Mr Howard Pettifer and Onderstepoort has shown that as many as fourteen different internal parasites can infest baboons. Seven of these species can also infest man, and the keeping and careless handling of baboons can therefore be dangerous. Infestations can be extremely heavy. Tapeworms totalling thirteen metres in length have been found in individual baboons, but it appears that these parasitic infestations do not generally have a particularly detrimental effect on their wild hosts.

Cave conservation

The Transvaal Nature Conservation Division exercises control over a most impressive series of caves in the Northern Transvaal. Students of the University of the Witwatersrand, led by Mr Kevin Smith, have been studying the geological composition of the Wolkberg caves. These caves contain some of the largest caverns in the country, but are not yet open to the public. Vandalism and damage done to caves for commercial purposes have indicated inadequate legal control, and the Division recently promulgated appropriate legislation. Transgressors can now be fined up to R1 200 or imprisoned for up to eighteen months in the caverns of the Department of Prisons!

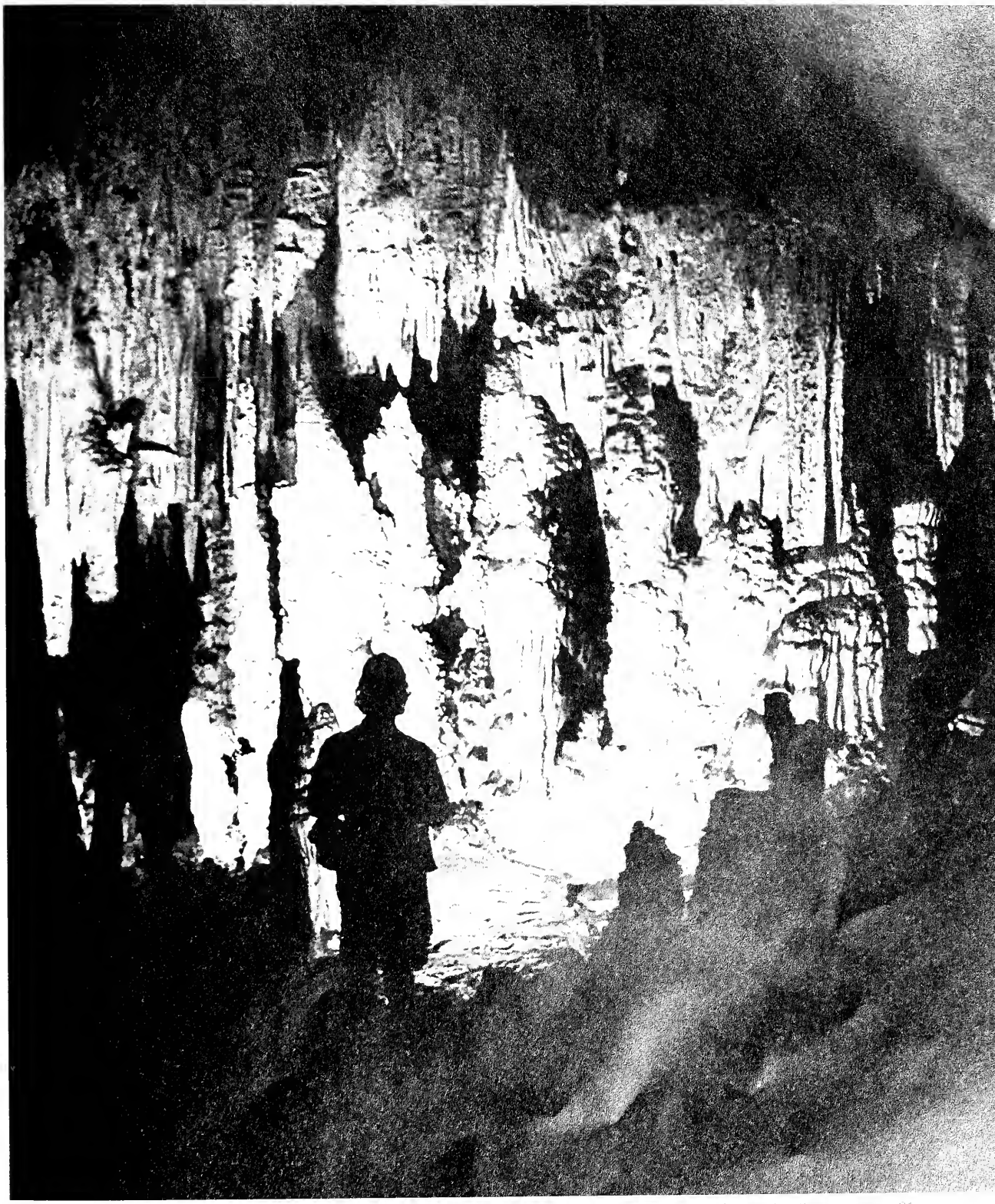
Re-evaluating plant conservation

Legislation protecting plants has not always had a satisfactory scientific basis. Mr Stève Fourie, one of the botanists of the Transvaal Nature Conservation Division, is now undertaking a project to establish the status and distribution of the rarer wild plant species. Valuable information will be collected in this way about factors threatening the survival of these plants. It is already clear that no less than 540 species require attention, of which 122 should be receiving special protection! Several species of *Euphorbia,* for example, which were previously unprotected, now face extinction. On the other hand, Mr Fourie's research has shown that some other plants previously regarded as rare, occur in large numbers in certain areas. Research of this nature is obviously of great importance to the formulation of conservation policies.

Special reserves for endangered plants

Six reserves have been proclaimed over the years by the Transvaal Nature Conservation Division specifically for the protection of rare plant species. The cycad, *Encephalartos eugene-maraisii,* receives special protection in the Lillie Nature Reserve, while the Ida Doyer Nature Reserve was established especially to protect two other cycads, *E. paucidentatus* and *E. heenanii.* The aloes, *Aloe albida* and *A. chortolirioides,* receive VIP treatment in the Tienie Louw Nature Reserve, while *A. thorncroftii* is equally well cared for in the Thorncroft Nature Reserve. The Cythna Letty Nature Reserve is a safe home for *A. vryheidensis.* The Vertroosting Nature Reserve near Sabie is the only place in the world where the beautiful red hot poker, *Kniphofia splendida,* is specially protected. Messrs Koos Oosthuyzen and Roelf Esterhuizen of the Hartbeeshoek Provincial Nursery are studying the above-mentioned cycad and aloe species, and the results of their monitor programmes are implemented in the planning of conservation policies for these unique plant reserves.

Cave conservation represents one of the newer and more unusual facets of nature conservation.



W. A. L. Gamble

Flora of the Blyderivierspoort Nature Reserve

The natural beauty of the Transvaal Nature Conservation Division's largest reserve — Blyderivierspoort — needs no introduction. Led by Mrs Lynette Davidson of the University of the Witwatersrand, botanists have compiled a list of the wild plant species growing in this reserve. The list will be published as a practical identification guide for use by visitors to the reserve. The Blyde protea, which is found only in this reserve, was discovered and described by Mrs Davidson during the course of her research.

Flora of the Witwatersrand

Mrs Davidson is including the Suikerbosrand Provincial Nature Reserve in her study of the plant species of the Witwatersrand. The publication resulting from her investigation should provide further knowledge of the vegetation to be found in this densely populated part of South Africa.

A scientific approach to kareebome

Not even the peace-loving kareeboom is escaping the attention of researchers nowadays. Mr R.O. Moffett of the University of the Western Cape is revising the taxonomic classification of this plant group. Part of his research will be undertaken in Transvaal provincial nature reserves, and we wish him luck with his interesting but complicated task.

Birds and mistletoe

One might be puzzled at first by the project title of the research undertaken by Mr S.K.B. Godschalk of the University of Cape Town. In contrast to naughty children who use mistletoe to catch birds, Mr Godschalk is interested in the distribution of seeds by birds feeding on the fruits of various mistletoe species.

Wetlands must be protected for water-birds

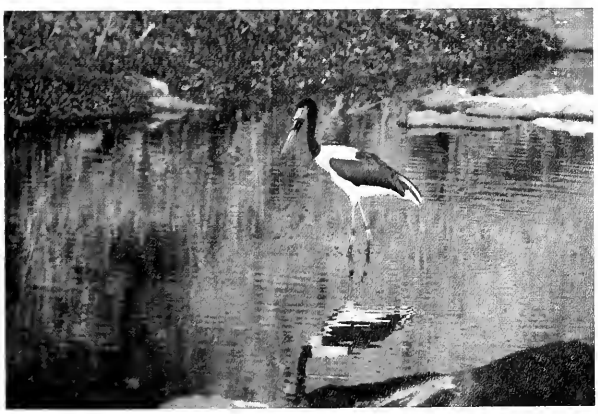
Certain species of South African waterfowl are scarce, in contrast to some foreign countries where large numbers of ducks and other water-birds are hunted annually. The migratory patterns of water-birds are such that provincial and international boundaries are crossed, and considerable numbers of these birds can be hunted in areas beyond our control. Little can be done to prevent this. In South Africa itself, it is therefore necessary to give all possible protection to wetlands and the waterfowl living in these marshy areas. Mr Dave Skead of the Transvaal Nature Conservation Division, in co-operation with researchers from other provinces, is now paying attention to the better protection of this important habitat type. The aim is to provide adequate shelter and food for the approximately 150 species of birds dependent on this type of environment.

Imported fish to solve anglers' problems

Excessive growth of aquatic weeds often hampers angling. The grass carp, a Chinese fish species known for its ability to control underwater plant-growth, is now being used experimentally by Mr Feltus Brandt in an attempt to overcome this problem in the Transvaal. Chemical spraying will also be tested as an alternative. Mr Brandt and Professor Schoonbee of the Rand Afrikaans University recently made headlines in the fish world by breeding the grass carp artificially. This is a noteworthy achievement, as overseas researchers have struggled for years to establish a successful breeding programme for grass carp. Before this fish species is released into local waters, researchers will have to establish conclusively that the grass carp will pose no threat to indigenous aquatic plant life. Another fish species receiving attention is the silver carp, which also originated in China. This fish feeds on phytoplankton and may be of use in the biological control of algae in our large dams.

Approximately 150 species of birds are dependent on wetlands for their survival. A wetland survey undertaken by the Transvaal Nature Conservation Division will result in recommendations aimed at the better protection of marshy areas.

W. Massyn



Dick Wolff

Fallow fields interest students

Any nature conservationist must have a full understanding of the different stages of plant growth in the natural development of plant communities. It is important to evaluate the condition of grazing land, for example, in order to obtain effective veld utilisation. Wildlife management students of the University of Pretoria, under the leadership of Professor Koos Bothma, visit the Suikerbosrand Nature Reserve regularly to acquaint themselves with the basic principles of veld succession. In so doing, they collect interesting information about the utilisation by different animal species of cultivated lands left to recover naturally.

Pretty but unpalatable

The Highveld landscape is usually envisioned as vast tracts of waving grasslands, interspersed with beautiful proteas. Although one might expect these grasslands to be suitable as grazing for game, this is not necessarily always true. The sour grass of the Highveld is largely unpalatable, especially during the dry winter months, when it is of low nutritional value. Professor Koos Bothma and his students from the University of Pretoria are studying the food preferences of game and the utilisation of Protea veld by the different animal species in the Suikerbosrand Provincial Nature Reserve.

Bankrotbos causes problems

Mr Mike Cohen of the Transvaal Nature Conservation Division will soon be paying attention to the unusual encroachment of the "bankrotbos", *Stoebe vulgaris*, in the Suikerbosrand Provincial Nature Reserve. In collaboration with private researchers, he will also be testing various selective herbicides for the control of this problem plant.

Green leaves or old twigs?

The influence of climatic and other environmental factors on the development of certain plant species forms an integral part of a research project currently undertaken by Mr Noel van Rooyen of the University of Pretoria. His project, carried out on the Roodeplaatdam Provincial Nature Reserve, includes the evaluation of different parts of plants used as food by the various animal species of the reserve. Although this is basically a botanical project, it will also provide valuable information about veld utilisation which can be used by game farmers and other wildlife managers.

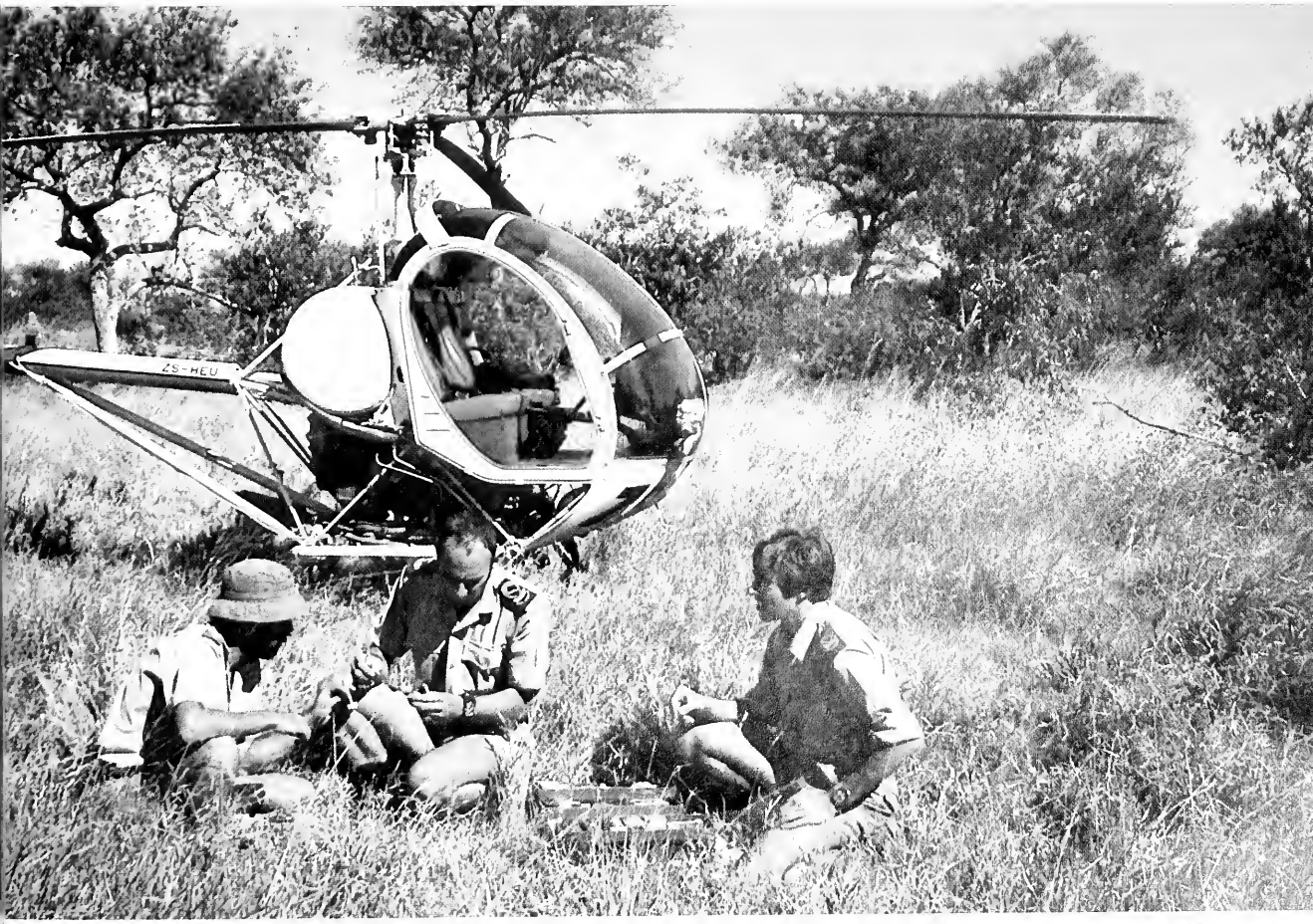
Bird's-eye view of some Eastern Transvaal nature reserves

The soil types and vegetation of an area determine to a large extent which animals will occur in that particular environment. Climate, disease and man-induced disruptions represent some factors influencing the survival of game in a certain area. A wildlife manager must base his management policies and practices on ecological principles and a thorough knowledge of the area concerned. Private nature reserves in the Eastern Transvaal represent some of the most important conservation areas in South Africa, and they consequently receive special attention from the researchers of the Transvaal Nature Conservation Division. Mr Petri Viljoen is in charge of a project which includes annual aerial censusses to determine game numbers and distribution, and surveys aimed at evaluating veld conditions on a regional basis. The overall picture obtained by these surveys is supplemented by continuous, more specialised projects in the same areas. The results of each year's research are processed and used as a basis for management recommendations made to landowners in this part of the country.

Lorna Stanton

Aerial censusses and plant surveys in the Eastern Transvaal provide valuable information on plant/animal inter-relationships.

Lorna Stanton



Veld management in provincial nature reserves

The Loskop Dam Nature Reserve is one of the oldest and most beautiful provincial nature reserves in the Transvaal. The complex nature of this reserve, and the accompanying grazing problems found in this sour-veld region during the dry winter months, present serious difficulties requiring special research. Mr Howard Pettifer has instituted a comprehensive research programme to study the habitat preferences and food requirements of the approximately twenty herbivore species found in the reserve. Information collected in this project is used in the planning of sound veld management programmes. Similar research has recently been started by Mr Pettifer in the S.A. Lombard, Bloemhof Dam and Boskop Dam Nature Reserves. These investigations are being continued by Mr Warren Brooks, who will make annual recommendations concerning the control of grazing in these reserves.

Mapping vegetation in the Lowveld

Wildlife researchers, realising that the distribution of antelope and other wild animal species is largely influenced by their preferred habitat types, spend much time studying the correlation of veld types and animal distribution. Mr Nick Zambatis has undertaken a large-scale botanical survey of the Klaserie Private Nature Reserve which may be extended to the other larger private nature reserves in the future. His mapping of veld types will be of considerable value in the planning of management procedures, such as veld burning, in the different sections of the study area.

Water for game

Research has shown that an adult elephant can drink more than 300 litres of water at a time. But how much does a giraffe drink? Or a steenbuck? Or any one of the many other wild animals for which the wildlife manager must make provision? This, and several other aspects of water provision for game, are being studied by Mr Nick Zambatis in the Klaserie Private Nature Reserve. This comprehensive ecological survey also provides for a study of the influence of available water on the utilisation of available grazing. The best methods of providing water for wild animals are also being investigated.

Tight lines!

Mr Julien Cadieux of the Transvaal Nature Conservation Division's research section is responsible for outdoor recreation research. His recent studies on angling showed that Transvaal anglers had investments totalling R130 million in fishing gear and other equipment. His survey also revealed that anglers spent a further R32 million annually on incidental, related expenditures. A total of 3 million man-days are spent beside angling waters every year, to catch an estimated 9,5 million fish. These fish are expensive, as it has been calculated that it costs an angler about R5,19 per kilogram for every fish he catches. The 120 000 anglers in the Transvaal remain adamant, however, that there is no other sport to compare with angling. Tight lines!

Recent surveys showed that the 120 000 anglers in the Transvaal spend about 3 million man-days annually practising this sport. They catch about 9,5 million fish per year.

Lorna Stanton

Lorna Stanton

Protea roupelliae

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Transvaal Nature Conservation Division

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INDEX

Tsessebe progress report 2
New status for lion 4
Endangered cycads of the Eastern Transvaal 6
Rare and unusual reptiles of the Transvaal 8
The cheetah success story 10
Jackal - friend or foe? 12
Angling in the Transvaal 16
Gamebird hunting management in the Transvaal 18
The influence of veld fires on the environment 20

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Tsessebe progress report

R Parris
Regional Representative (Northern Region) and

J M Smith
Principal Nature Conservation Officer

One of the major responsibilities of the Transvaal Nature Conservation Division is to ensure the continued survival of all species indigenous to the province.

Certain antelope species such as the tsessebe *Damaliscus lunatus* have become rare in the Province within living memory, through a combination of poaching and an inability to adapt to changing land-use systems. The Division's aim is to halt this decline and to increase the population of each threatened species.

One of the ways of achieving this is to establish breeding herds on certain provincial nature reserves and then to relocate surplus animals from these herds in suitable areas where their safety is assured.

In the case of the tsessebe, the Division's breeding programme began in 1966 with the establishment of the first breeding herd of 15 animals on the Percy Fyfe Provincial Nature Reserve, situated between Pietersburg and Potgietersrus in the Northern Transvaal.

The herd increased steadily to 77 in 1972. In 1973 twelve cows were captured on private farms north-east of Ellisras in the Waterberg district and released on the Percy Fyfe Nature Reserve to boost the numbers of the existing herd.

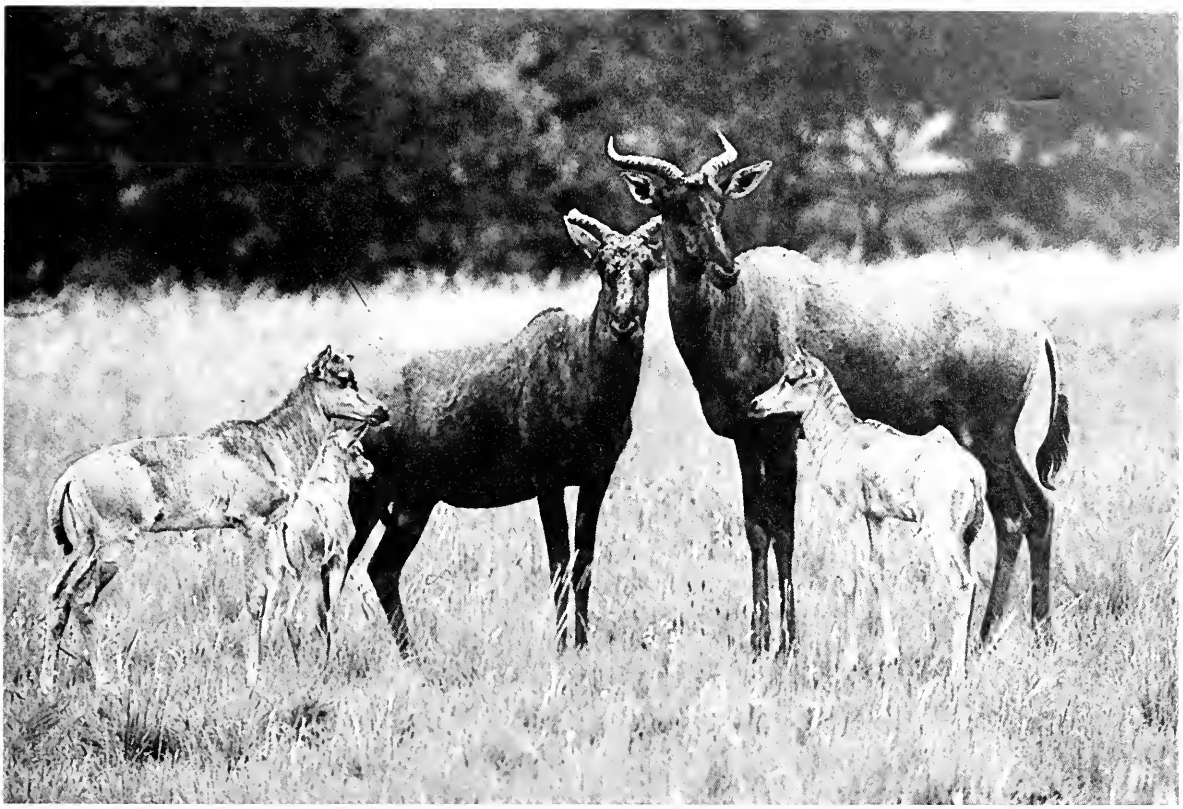
By 1975 the numbers on Percy Fyfe had increased to 122, which made the establishment of a second breeding herd possible. 28 Animals were translocated to the newly-established Doorndraaidam Provincial Nature Reserve south of Potgietersrus.

In 1976 another 13 tsessebe were moved from Percy Fyfe to Doorndraaidam and the combined number on both reserves reached 178 by the end of that year.

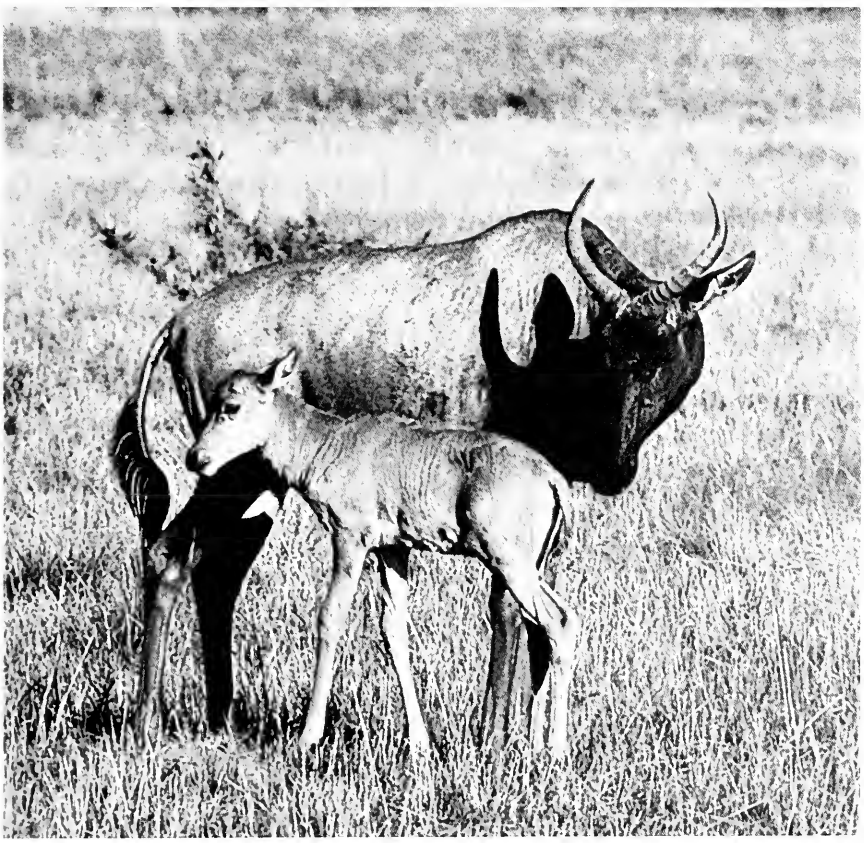
With the new herd at Doorndraaidam doing so well (it had increased from the 41 animals initially released on the reserve to 79 in only two seasons), the Nylsvley Provincial Nature Reserve near Naboomspruit was chosen as the site for the Division's third breeding herd. In May 1977, 25 tsessebe were moved from Percy Fyfe to Nylsvley. The first phase of the conservation programme, the establishment of viable breeding herds on provincial reserves, had been completed successfully.

The second phase in the programme, entailing the translocation of tsessebe to new areas of suitable habitat where they would receive the necessary protection, was initiated in 1978. Twelve animals were moved from Percy Fyfe to the Natal Parks Board's Itala Nature Reserve in Northern Natal. Similar relocations were undertaken in 1979 and 1980 and another five new breeding herds were thus established in five different bushveld areas of the Transvaal.

In May 1980 the grand total of the three provincial breeding herds and the six new herds stood at 328 tsessebe. All these animals had been bred from the 27 animals brought into Percy Fyfe. If the same rate of progress can be maintained during the next 14 years, it may even be possible to remove tsessebe from the list of rare and endangered antelope in the Transvaal.



Lorna Stanton



Lorna Stanton

Above: Tsessebe are sociable animals.

Left: The future of the species in the Transvaal seems assured.

New status for lion

W K Kettlitz
Senior Professional Officer

Before 5 December 1979, the lion was classified as a "wild animal" in the Transvaal. This meant that a landowner could hunt lion without a permit or licence, be it winter or summer, day or night. He could also transfer this right to hunt to anyone else.

As lion could be hunted almost at will, there are certain old-time Lowvelders who claim to have shot more than 500 lions.

The lion is our largest carnivore and presents a challenge to the hunter on account of its cunning and mobility. Due to the considerable element of danger involved, it is one of the most sought-after hunting trophies.

On account of the fact that many of the African states are now closed to foreign hunters, more attention is being paid to the hunting potential of the Republic.

The fees demanded and willingly paid for an opportunity to go lion hunting formed the basis of a very lucrative trade, with the result that the hunting pressure on lion became increasingly severe, and as lion became rarer, even more pressure was exerted.

For several years, the skin and other products of a lion have been worth hundreds of rand and as a hunting trophy a lion is currently worth thousands of rand.

All these factors contributed to the indiscriminate exploitation of lion and it became apparent that action had to be taken to afford it a degree of protection.

The Nature Conservation Advisory Board recommended, after thorough consideration of all the facts, that lion should be declared "ordinary game". The issue was also taken up with the Nature Conservation Committee of the Transvaal Agricultural Union, after which, on 5 December 1979, lion were declared "ordinary game" by the Administrator.

This empowers the Administrator to declare a "close season" for the hunting of lion. During a close season, no person may hunt lion unless he is the holder of a permit issued by the Administrator. When considering the issuing of such a permit, several factors are taken into account, such as the size of the land, whether lions occur permanently on the land and whether the land can sustain lions on a fulltime basis. The lion population of the area as a whole is also taken into consideration.

When no close season for lion has been declared by the Administrator, they are "open" to being hunted. This means that the landowner and his direct relatives may, with his written consent, hunt lion without a licence or permit.

The owner may also grant outsiders written consent to hunt lion on his property. These outsiders must, however, obtain a hunting licence from any Receiver of Revenue in the Transvaal, before undertaking the hunt. The licence fee is R100 per lion.

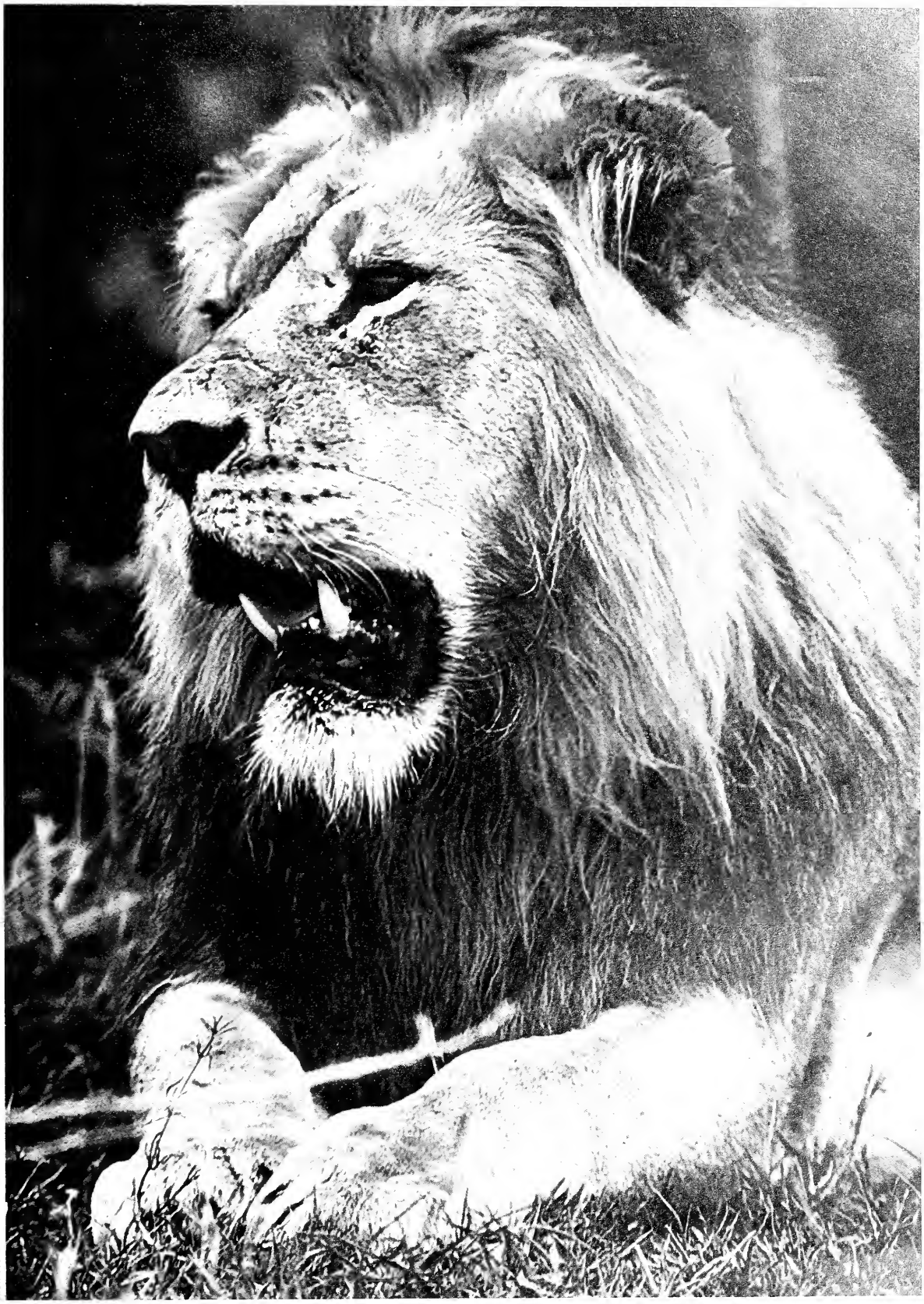
The declaration of lion as ordinary game also provides for additional protection in that the lion may no longer be hunted at night without a permit from the Administrator.

Stock farmers are protected against lion depredation by the fact that they can apply in advance for permits which will enable them to protect their stock against marauding lions. It is hoped that these measures will ensure the better utilisation and protection of this most regal of predators.

Africana Museum, Johannesburg

Above: Uncontrolled hunting in the past led to severe over-exploitation of the lion population.

Right: A male lion in his prime is a highly valued trophy.



Dick Wolff

E. Fourie

Encephalartos laevifolius. A specimen of this size is hundreds of years old.

Endangered cycads of the Eastern Transvaal

E Fourie
Nature Conservation Officer

In the Drakensberg region of the Eastern Transvaal, a number of our most beautiful and scientifically important plant species are being threatened, directly or indirectly, by the manifold activities of man.

The destruction and impoverishment of habitat, primarily as a result of afforestation, is beyond any doubt the main factor contributing to the present precarious status of many species of cycads.

Of the twelve species of *Encephalartos* occurring in the Transvaal, only four can be considered threatened or endangered, due to their extremely restricted distribution.

The dwarf cycad *Encephalartos humilis,* which is restricted to the catchment area of the Crocodile River, was formerly classified as vulnerable. A recent survey indicated that 70% of the species' natural habitat has been encroached by monoculture plantations of exotic trees such as *Pinus elliotii, Pinus patula* and *Pinus taeda,* and as a result it has now reached endangered status. The survival of remnant wild populations is further threatened by the activities of irresponsible and unscrupulous collectors, and by burning programmes which result in the yearly destruction of thousands of seedlings.

The distribution range of *Encephalartos humilis* overlaps with that of a closely related species, *E. laevifolius,* in the vicinity of Ngodwana near Nelspruit. This beautiful plant can be distinguished from *E. humilis* by certain diagnostic characteristics. The rachis of *E. humilis* is yellow and recurved while that of *E. laevifolius* is longer and straighter. *E. humilis* is a dwarf plant with an underground trunk which seldom projects more than 30 cm above ground level, while *E. laevifolius* has a well-developed trunk which may reach a height of three or four metres. In contrast to the single cone of *E. humilis, E. laevifolius* may bear from one to five cones at a time.

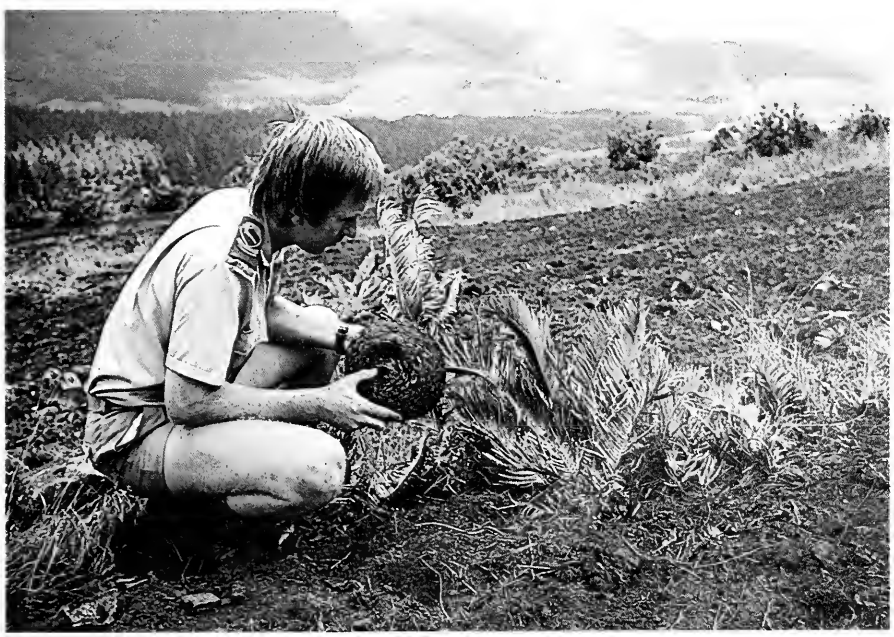
Encephalartos laevifolius is restricted to the Kaapsehoop mountains, where it is found all along the escarpment on exposed rocky outcrops. The numbers of this attractive and hardy plant have been greatly depleted as a result of forestry activities in the area and it will be a candidate for endangered status in the near future.

The very rare endemic Transvaal cycad *Encephalartos inopinus* is only found in the hot, dry valleys near Penge. The specific name *inopinus,* which means "unexpected" refers to the surprise discovery of this new species of cycad at a relatively late stage of botanical research in South Africa. Due to extreme climatic conditions and other factors, very little active regeneration takes place in their natural habitat.

Encephalartos cupidus is a dwarf species with the trunks of mature plants rarely exceeding 50 cm in height. As in the case of *E. humilis,* this species suckers freely from the base, forming clusters of 8 to 12 heads. This cycad is frost-hardy and is only found in the picturesque Pilgrim's Rest district. It is an attractive plant which is much sought after by collectors, and the specific name *cupidus* means "that which is desirable".

The extremely restricted distribution of these four cycad species is an indication that they were already practically extinct before the interference of man, but current land use patterns and other factors are unfortunately accelerating this process inexorably. For this reason cycads, as a group, enjoy the highest protection status under the Nature Conservation Ordinance, namely that of specially protected plants. The gathering, uprooting, transport, export, import, trade in, donation or possession of cycads is strictly controlled by means of a permit system and courts may impose heavy fines or prison sentences on violators.

The most stringent legislation in the world is of limited value without public support, however. A general awareness of and concern for the fate of these unique plants in their natural habitat will contribute greatly towards their conservation.



Lorna Stanton

Destruction of *Encephalartos humilis* habitat. This area has been cleared for afforestation.

Rare and unusual reptiles of the Transvaal

N H G Jacobsen
Senior Professional Officer

The Transvaal is a province of great beauty and splendour. From the eastern mountains to the plains flanking the Kalahari and from the baobab forests of Venda to the grasslands of the Highveld, there is an enormous variety of plants and animals — remnants of tropical and Cape fauna and flora established along ancient dispersal routes. It is a region of the spectacular and the unusual and not least among all these are the reptiles, of which we are endowed with a rich variety. Some 78 species of snakes and about 100 species of lizards, three tortoise species and two terrapin species are found in the province, occupying almost every available habitat.

Due to a greater emphasis on the conservation and status of reptiles in the Transvaal, a survey was undertaken to determine their distribution as an aid to their protection. The survey began during 1978, and soon exciting and unusual finds were being made.

Foremost among these was the discovery of Stevenson's dwarf gecko *Lygodactylus stevensoni* in the hot, dry Limpopo valley in the Northern Transvaal. It was originally thought to occur only in Zimbabwe. This is a beautiful lizard which frequents rocky outcrops and one has to look very carefully to see it as, in a flash, it slips into a crevice to hide. It is able to leap distances of up to 30 cm, which is remarkable for an animal only six cm in length.

Also occurring in the north-eastern corner of the Transvaal, and in fact originally thought to be restricted to the Kruger National Park, is the Msimbiti worm-lizard *Chirindia langi* which, although superficially resembling an earthworm, is in fact a lizard. It spends its life underground, particularly under stones and logs, where it occupies small tunnels. It has a small head with pigmented eyes and small conical teeth which are used to crush its prey, mainly termites. It is closely associated with the Msimbiti or Lebombo ironwood *Androstachys johnsonnii* in the east, but as this plant peters out in the Wylliespoort area, it casts off this apparent affiliation and its distribution continues to Waterpoort, where it may be found in open woodland.

This north-eastern corner of Venda also harbours two unique and very rare reptiles, the golden limbless skink *Typhlosaurus aurantiacus fitzsimonsi* and the black-lined skink *Mabuya homalocephala depressa*, which dwell in the deep aeolian Kalahari sand. The former spends all its life submerged and "swims" through this ocean of sand, assisted by a broad shield-like scale on the front of the head. It is streamlined because of its lack of limbs and twists and winds its way into the sand. They are viviparous animals and up to two young are produced during the summer months. The black-lined skink is, on the other hand, a surface dweller and when the need arises can run rapidly across the sand, but if pursued closely will suddenly crash-dive, and with a few snake-like movements disappear under the loose, drifting sand. It is assisted in running on the loose sand by scales under its toes, and its head is slightly pointed.

In the valleys and along the mountain tops of the Southpansberg lives a rare lizard, the Soutpansberg mountain lizard *Lacerta rupicola*. Originally described in 1931 by Dr V F M FitzSimons, the renowned

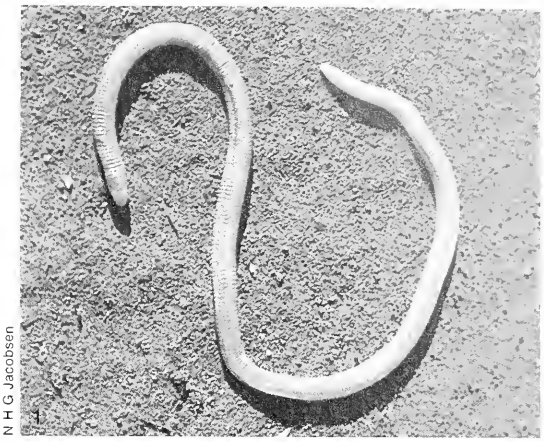
N H G Jacobsen

A hitherto unknown and undescribed species of *Afroedura*, a rare rock-living gecko from the Soutpansberg.

herpetologist, from a single specimen discovered at the sacred Venda lake of Fundudzi, it was not seen for another 18 years until Dr McLachlan found it on the mountain top behind Louis Trichardt in 1949. From then until the present date no further sightings were recorded in spite of careful searching. It was only during this survey, 30 years after the last sighting, that this lizard was found again at the type locality of Fundudzi. Three additional sightings and collections were made, extending its hitherto limited distribution about 100 km to the west. It is a rock-dweller but does not appear to be frightened of humans and will wander over and under boulders close to one. However, should one try to catch it, it flits off at an incredible speed to disappear among the jumble of rocks.

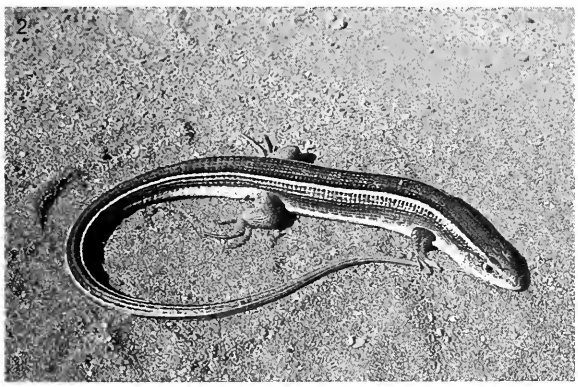
Among the snakes, the burrowing Transvaal quill-snouted snake *Xenocalamus transvaalensis,* so named because of its extremely pointed snout, is a great rarity. So far none have been encountered during the survey but it does occur in the northern Transvaal, where its subterranean existence makes it very difficult to find. It is highly selective, feeding on burrowing limbless skinks and amphisbaenians. It rarely comes to the surface and then only during the rainy season.

These are but a few of the rare and unusual reptiles found in the province and because of the fact that previous collections were few and far between, it was logical that some species not known to science should be found. These include several dwarf geckos restricted to mountain ranges such as the Blouberg, Waterberg and Drakensberg, while the beautifully coloured flat rock lizards *Platysaurus* spp. as well as a blue throated plated lizard *Gerrhosaurus* sp. may also be mentioned. The variety is almost endless and the people of the Transvaal are blessed with this spectacular array of colourful and unusual animals which form such an integral part of our heritage.



N H G Jacobsen

1. The common name for *Chirindia langi* is derived from its supposed association with the Msimbiti Ironwood tree.
2. Another possible new spesies, this blue throated plated lizard *Gerrhosaurus sp.* was also collected in the Soutpansberg.
3. *Typhlosaurus aurantiacus fitzsimonsi* is without limbs, an adaptation to a subterranean existence.
4. *Lygodactylus stevensoni* was recorded for the first time in South Africa.
5. On account of its subterranean lifestyle, no specimen of *Xenocalamus transvaalensis* has yet been found during this survey.



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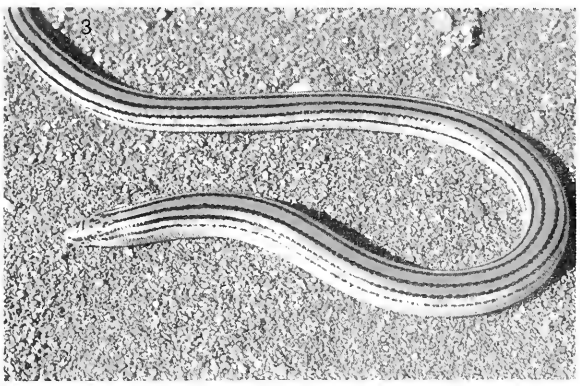

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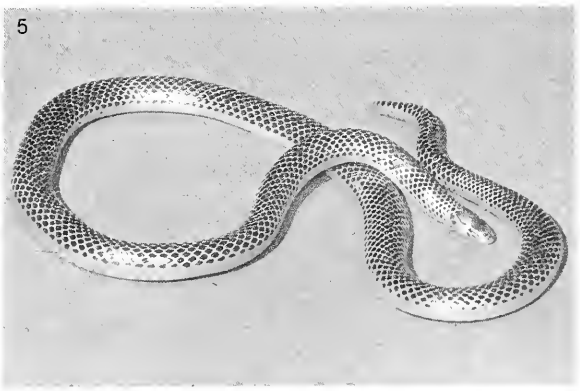


W D Haacke

The cheetah success story

Dr E Young
Assistant Director (Specialist Services)

In a previous edition of this magazine (No. 29), it was announced that the Transvaal Nature Conservation Division had embarked on an ambitious project to rescue cheetah on stock farms where they would otherwise have been shot, and to relocate them in safer areas. The Klaserie, Timbavati and Sabi Sand are some of the larger private nature reserves with good conservation reputations which were entrusted with these valuable carnivores.

Since the initial stages of the Division's rescue operation, tremendous strides have been made in establishing cheetah breeding nuclei. Research has at the same time been intensified. Noteworthy indeed is the establishment of the Cheetah Study Group comprising about thirty members, all actively involved in cheetah research in the Transvaal. Several university theses have been registered and some have already been completed or are nearing completion. Many scientific and popular articles have appeared over the last few years, indicating South Africa's leading role in cheetah conservation.

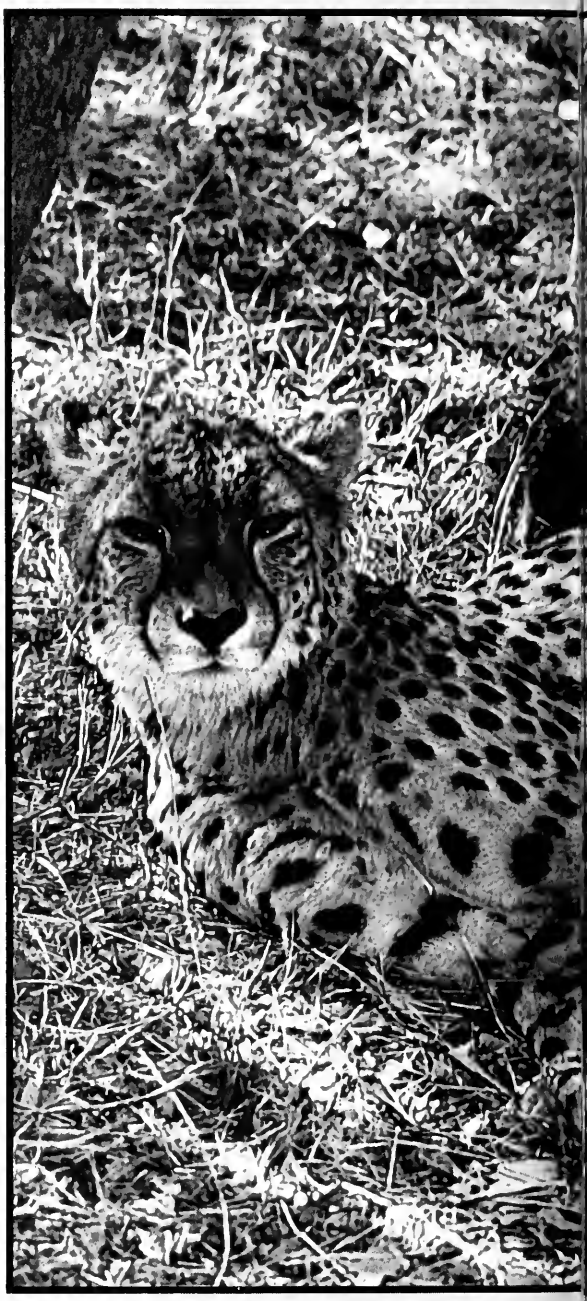
In this resumé, specific mention is made of two of the many projects currently being undertaken in South Africa.

At the De Wildt Cheetah Breeding Station, Miss Ann van Dyk, with the support of Dr Woody Meltzer and the National Zoological Gardens, Pretoria, has succeeded in breeding over 160 cheetah cubs in captivity during the last five years. The survival rate has increased markedly since the initiation of the project, and more and more cheetah are becoming available for the establishment of new breeding groups. Ann's success is especially noteworthy when one considers the fact that for several years she has succeeded in breeding more cheetah per year than could be bred in all the zoos in the world combined.

Recently, a joint project was undertaken to try to re-establish some of the De Wildt cheetah in the wild. Three sub-adult animals were radio-collared by Mr Howard Pettifer and his fellow researchers of the Nature Conservation Division's Research Section. With the kind co-operation of the South African Air Force, these cheetah were initially released at the Hoedspruit Air Force Base in the Eastern transvaal, where they soon succeeded in killing their own prey. They were then recaptured and transferred to a more spacious area on Mr Hans Hoheisen's beautiful farm Kempiana, bordering the Kruger National Park.

Following the Hoedspruit example, Mr Pettifer and his team again followed and studied the movements and behaviour of these marked cheetah. Radio-telemetry equipment was used to facilitate the tracking of the animals. The preliminary results are most promising and will be published later in greater detail by Mr Pettifer. It suffices at this stage to report that the cheetah adapted quite well to the wild and that successful hunting was not the greatest obstacle.

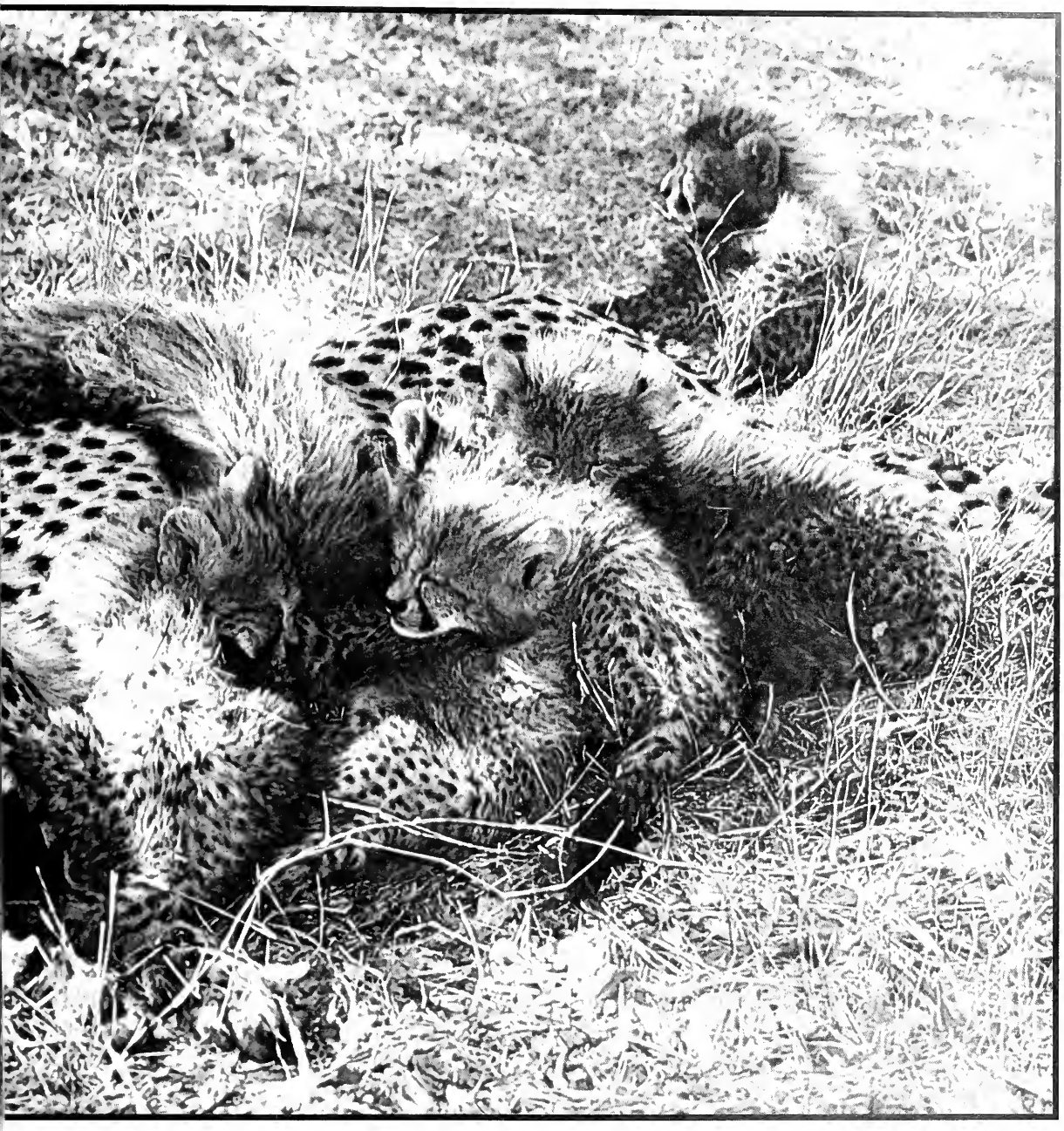
The introduction of cheetah into the Suikerbosrand Provincial Nature Reserve near Heidelberg represents another milestone in the success story of cheetah conservation. The eight cheetah released into this reserve since 1975 have increased in number by more than 500%. At the same time, it was proved that the introduction of rare carnivores such as cheetah can, in certain circumstances, not only contribute to the successful propagation of the carnovore species but, at the same time, reduce the need for culling surplus antelope.



Lorna Stanton

The greatest achievement of the Suikerbosrand cheetah project, however, does not lie in the successful breeding of cheetah, but in the fact that these wild-bred cheetah constitute a source of experienced hunters most suitable for relocation purposes. Their veld experience will, beyond doubt, also contribute to a greater chance of success during the initial difficult period of adaptation in the wilderness. At this stage they have to compete with other wild carnivores, and at the same time avoid contact and possible confrontation with their most important enemy . . . man himself!

The history of the cheetah elsewhere in the world is a sad one. This beautiful cat has disappeared from most of its former range in Africa, the Middle East and Asia. The



Once released into suitable habitat, captive-born cheetah seem to have no trouble hunting and killing successfully.

abovementoned success in the breeding and experimental relocation of cheetah does, however, hold new hope for the survival of the species. Cheetah from the Suikerbosrand population were recently released into the Rolfontein Nature Reserve in the Cape Province, the Eastern Shores Nature Reserve near St. Lucia in Natal, and the Timbavati Private Nature Reserve in the Eastern Transvaal.

Provided that political barriers do not bar this very threatened species from access to its former range in the Middle East, there is no reason why South Africa's successes will not lead to the challenging possibility of re-establishing breeding populations of cheetah in countries where existing remnant populations are fighting a seemingly losing battle to survive, or where they have already become extinct.

Lorna Stanton

JACKAL FRIEND OR FOE?

Canis mesomelas.

Jackal — friend or foe?

J W H Ferguson
Senior Professional Officer

Whenever we want to describe someone as cunning and sly, we call him an old jackal. The fact that the cunning and adaptability of jackals is proverbial is evident when one realises that they are able to make a living in all types of environment — from the Namib desert to the fringes of Sandton.

Five jackal-like species occur in Southern Africa. The black-backed jackal *Canis mesomelas* needs no introduction. It is the most common jackal, and its tawny red legs and blackish back make it easy to identify. The side-striped jackal *Canis adustus* is a close relative of the black-backed jackal and is fairly rare. It is grey with a conspicuous white stripe on each flank and usually has a white tip to its tail. The Cape fox *Vulpes chama*, which is much smaller than the true Southern African jackals, has an attractive pelt, although it is not as valuable as the pelt of its European relative, the red fox. The bat-eared fox *Octocyon megalotis* is a relative of the Cape fox and can easily be identified by its very large ears and blackish tail and legs. The aardwolf *Proteles cristatus*, although often confused with jackals and foxes, is hardly related to them at all. It is more closely related to the hyaenas and can easily be identified by the dark vertical bars on its body, as well as by its hunched posture.

Some jackals are quire rare. The side-striped jackal occurs only in subtropical parts of our country, in the vicinity of larger rivers such as the Letaba and Olifants. Apart from their rarity, side-striped jackals are secretive animals which are seldom seen. The bat-eared fox is also uncommon in the Transvaal, where it is limited to the dry bushveld of the western and northern areas. Cape foxes are fairly common on the Highveld, as well as in the Karoo. Their calls, which closely resemble that of a crying baby, have baffled many a person.

The black-backed jackal and aardwolf both have a wide distribution throughout the Republic. While the aardwolf apparently prefers the Highveld and Karoo areas, the black-backed jackal is encountered almost everywhere. It is interesting to note that most of the jackal species prefer a specific habitat type.

Since each specialises in a different food source, competition among the different jackal species is minimised. Both the aardwolf and the bat-eared fox are almost exclusively insectivorous, and their dentition is specially adapted for this purpose. They are physically incapable of chewing meat. The side-striped jackal apparently feeds mainly on insects and veld fruit. Very little is known about the habits of this animal. Cape foxes catch insects and small vertebrates such as mice, shrews and birds. Since this animal has a mass of only 3 kg, it is clear that it cannot kill a fully-grown sheep, which usually tips the scale at at least 20 kg. There are cases on record, however, where Cape foxes have caught lambs which were a week or two old.

Black-backed jackals live on insects, mice, birds, springhares, hares, berries and even groundnuts and maize. This species is undoubtedly the most adaptable of our jackals, and is almost always the culprit in cases where jackals cause damage on stock farms. An interesting phenomenon often encountered on stock farms where black-backed jackals kill sheep, is that this damage is caused by an individual which has become "spoilt" and has learned to catch sheep.

The aardwolf is the only one of the five species which sleeps in a hole during the day. The other four sleep in the veld, underneath a dense bush or in some other sheltered place. They normally only go into aardvark holes to pup. Although the black-backed jackal is sometimes encountered during the day, all these animals are mainly nocturnal.

Contrary to popular belief, no scientific proof exists that jackals play an important part in the spreading of rabies. Although the animals may contract the disease, research by the Transvaal Nature Conservation Division suggests that it is improbable that jackals represent an important factor in the transmission of the disease.

An extremely interesting phenomenon has recently come to light and needs further study. When a predator species is exterminated in a specific area, it is often replaced by other predator species. As an example, the area on the Transvaal Highveld between Belfast and Waterval-Boven may be cited. Upon the extermination of black-backed jackals in the area, caracal increased rapidly in number. Because of the fact that caracal caused serious damage to stock in the area, the campaign against the jackals was suspended and the jackal population had an opportunity to recover and increase in number, upon which the caracal problem suddenly disappeared. Today there is practically no caracal problem and jackals are found in the area again.

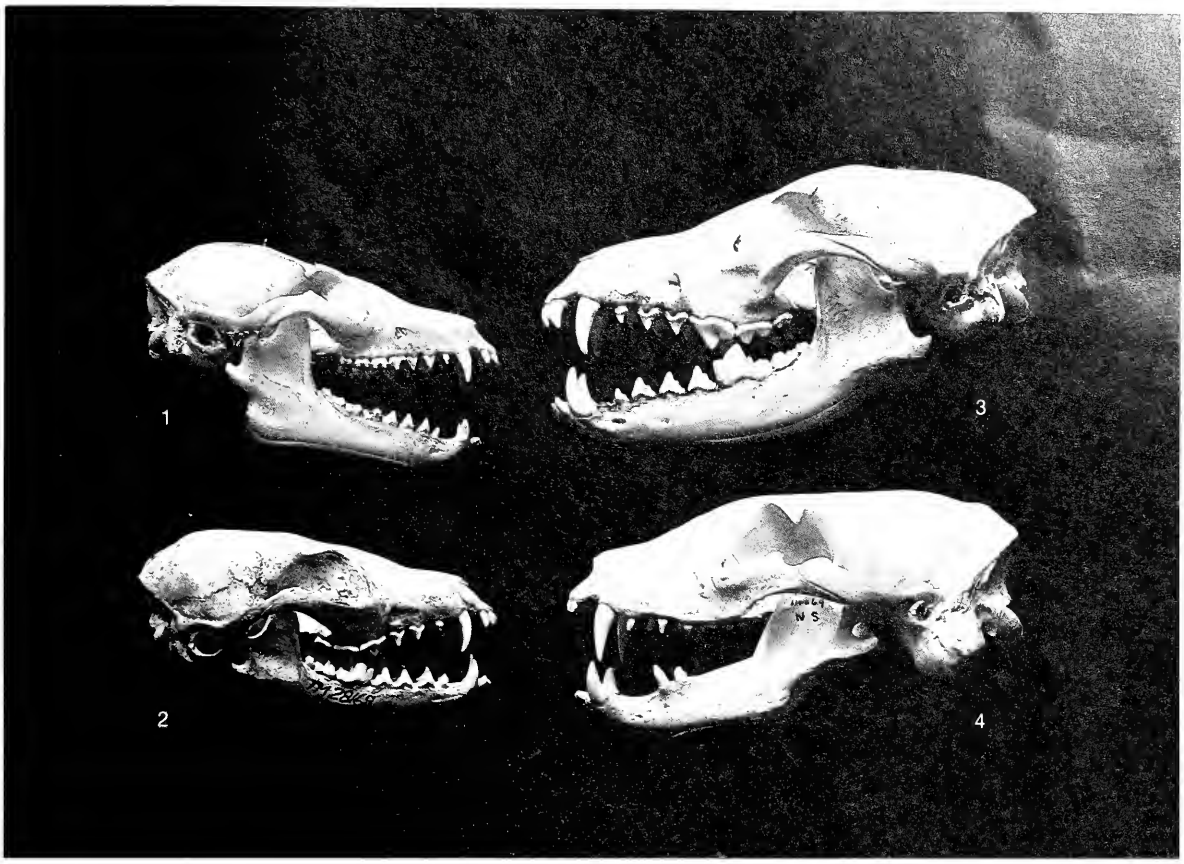
The presence of jackals on a farm does not signify immediate disaster to the farmer, even though the animals may call all night long. Apart from his disadvantages, Foxy has his advantages too.

H J Smithers

Canis adustus.

Lorna Stanton

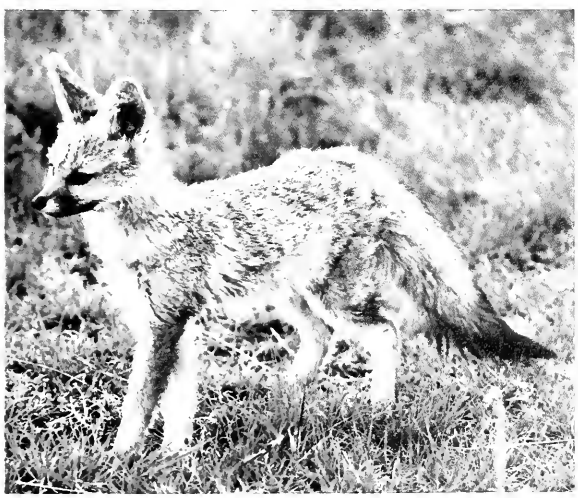
Octocyon megalotis



Lorna Stanton

Skulls of 1. *Octocyon megalotis*, 2. *Vulpes chama*, 3. *Canis mesomelas*, 4. *Proteles cristatus*. The dentition of *P. cristatus* and *O. megalotis* is adapted to an insect diet. The molars of *O. megalotis* are flattened with rounded cusps, adapted to crunching the hard exoskeletons of insects. The molars and premolars of *P. cristatus*, which lives on termites which are swallowed whole, are so reduced as to be virtually useless for anything. On account of their specialised dentition, these two species cannot eat meat, even if it were available.

The well developed last upper premolar and first lower molar of *C. mesomelas* and *V. chama*, with sharp cutting edges excercising a shearing action, are adapted to a meat diet. The heavier and more massive dentition and jaw structure of *C. mesomelas* indicates larger prey being taken.



Lorna Stanton

Vulpes chama

Lorna Stanton

Proteles cristatus

Angling in the Transvaal

J Julien Cadieux
Senior Professional Officer

The management of public dams for conservation and recreation purposes requires a sound knowledge of the resource and the users. One of the more important resources for water-based recreation is the availability and proper balance of different species of angling fish. Although much information is available on the biological aspect of sport fishing, knowledge of the anglers and their activities was until recently virtually non-existent.

A comprehensive study was therefore undertaken at the end of the 1977/78 angling season. This study was aimed at —

1. determining the angling pressure on dams and rivers in the Transvaal;
2. identifying the most sought-after species of fish, and the species most exploited;
3. ascertaining the popularity and quality of angling, and
4. determining the economic impact of angling.

It was calculated that during the 1977/78 season, anglers harvested an approximate total of 9,5 million fish with a total mass of 9,6 million kg from Transvaal waters. This represents an increase of 179% on the number of fish landed in the 1956/57 season, when a similar study was conducted.

Kurper *Tilapia* spp. and carp *Cyprinus carpio* are the fish most often caught in the Transvaal, followed in lesser quantity by mudfish *Labeo* spp. and yellowfish *Barbus* spp.. The bar graph shows the number of fish per species landed, and the percentage of the total catch which it represents. The season was described as average by 55% of the anglers who took part in the survey, while 28,4% considered the season a poor one and 13,7% thought it had been good. Some anglers could not express their opinions on this point.

The most popular angling spots are dams and rivers near main population centres, such as Hartbeespoort Dam, Vaal Dam, Roodeplaat Dam and the Vaal River west of the Vaal Dam.

It was calculated that anglers had in their possession fishing tackle and equipment valued at approximately R129,8 million at the beginning of the 1977/78 season. Caravans, boats and outboard motors, as well as fishing tackle, are the most costly items anglers spend their money on. It should be noted that caravans, representing 42% of this investment, although indicated as being used primarily for angling, may not necessarily be used solely for this purpose.

Anglers spent an estimated R32 million on their sport during the 1977/78 season. The largest proportion was spent on transport, which accounted for nearly 30%. Expenses incurred on fishing gear and equipment represented nearly 26%, while expenses on refreshments was also a major item at 24%.

Other interesting facts are that anglers devoted over 3 million man-days to their sport, and travelled close to 160 million km to and from their fishing spots.

One of the more striking points emanating from this study is that the quality of angling is as good today as, if not better than, 20 years ago. Indeed, even though the average angler fishes less often today (27,7 days per year compared to 34,6 days in 1955), he lands more fish of a slightly larger mass than before. Today, the average Transvaal angler catches approximately 84 fish with a total mass of 85 kg per year, compared to 70 fish weighing 63 kg in 1956/57.

Another important discovery arising from the study is the change that has occurred in the composition of the catch. While kurper accounted for 50% of all fish landed in 1956/57, it is down to one-third today. This species, however, seems to have increased slightly in size. Carp are caught more often today, but the average individual of this species would seem to be smaller in size.

Yellowfish are caught less often today and also represent a smaller percentage of the total mass of fish landed. Barbel *Clarias gariepinus* are caught in more or less the same numbers today as before. The average individual, however, is slightly larger in size. Finally, mudfish are also caught in greater numbers today while the average individual mass has decreased slightly.

These changes in the composition of the catch represent an invitation to accelerate our programme of research and establish a permanent system of data collection.

Although we have identified a definite change in the catch composition, we need to know more about each dam and river. Indeed, we do not know at this stage whether this increase in the number of fish landed per angler per year is due to the fact that the quality of angling has improved equally everywhere, or only at specific places. Nor do we know the extent to which improvements in the techniques of angling and the quality of fishing tackle have influenced the change.

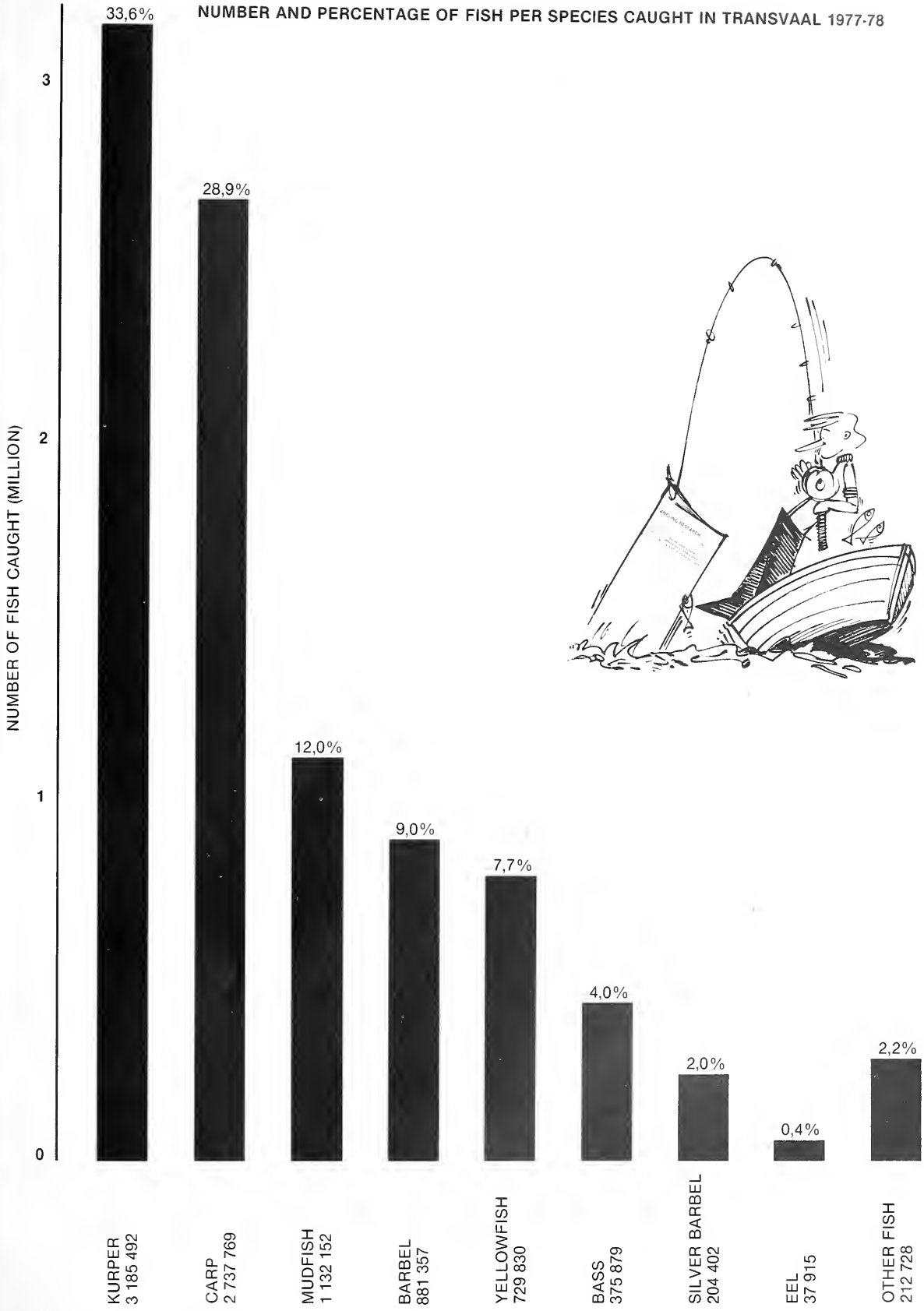
A creel survey was implemented at the end of 1978, but the collection of data proved difficult and irregular. A new method of data collection was then designed and is now being implemented at all the dams under the control of the Division.

The new creel survey is designed to be self-administering and to make a permanent collection of data possible at all the dams and rivers manned by officials of the Division. We shall therefore be able to monitor, year after year, the number, species and mass of fish landed at each dam and to identify any changes occurring in our waters. This information will help our fish biologists in their task of ensuring high-quality angling in the Province.

Lorna Stanton

More kurper are caught than any other fish in Transvaal waters;

NUMBER AND PERCENTAGE OF FISH PER SPECIES CAUGHT IN TRANSVAAL 1977-78



Gamebird hunting management in the Transvaal

C J Nel
Senior Professional Officer

Gamebird hunting is a field sport which dates back to the invention and development of the shotgun in Europe and England, several centuries ago. It has a long and colourful history and has traditionally been considered the sport of gentlemen, incorporating certain unwritten rules, voluntary restraints and ethical considerations. As a large sector of the South African population has its roots in Europe and England, it is to be expected that gamebird hunting would have an enthusiastic following in this country.

The popularity of gamebird hunting has for many years shown a steady increase in the Transvaal. A new type of hunting licence was introduced in the 1975 hunting season and 3 208 bird hunting licences were issued to non-landowners during that year. In 1979, 5 698 licences were issued, representing an increase of 77,6% in only four years.

As in the case of any commodity or service in our free enterprise system, the availability of gamebird hunting opportunities is governed by the law of supply and demand. The licence figures indicate a rapidly increasing demand, while the total land that will ever be available to support gamebird populations will, at best, remain relatively finite. It is clear that if present trends continue, the average gamebird hunter will be increasingly hard-pressed to find a place to shoot in years to come, in addition to having to pay more for the privilege of shooting.

One of the functions of the Transvaal Nature Conservation Division is the scientific management of populations of wild game, in the interests of both quality hunting and conservation of the game species concerned. As most land in the Transvaal is privately owned, the key to successful gamebird management lies in motivating the landowner and making him aware of the value of viable populations of gamebirds on his land. As quality gamebird hunting opportunities become increasingly difficult to obtain, the landowner who manages his habitat and gamebird populations wisely will find that this makes sound economic sense. The income derived from allowing controlled hunting on his land will more than pay for his implemented management steps. Indeed, seen in pure economic terms only, there is no reason why gamebirds cannot be incorporated into a modern farming system, supplementing the landowner's income on a sustained yield basis.

As the authority responsible for the conservation and management of gamebirds in the Transvaal as a whole, the Division faces several challenging problems. It has become obvious that in order to ensure both viable gamebird populations and quality hunting in the years to come, the Division will continually have to upgrade its level of research on and management of gamebirds, hunting and associated problems.

A fundamental management requirement is the availability of reliable information on the pressure exerted yearly on the gamebird population by hunters. Hunters are required to submit details on what they have shot during the hunting season, in the form of a hunting returns sheet attached to the licence. This information is

A good companion and a trained gundog make all the difference

C J Nel

Lorna Stanton

A young helmeted guineafowl. Wise management increases the carrying capacity of the habitat, and consequently also the gamebird population.

analysed by computer to gain an overall impression of the hunting pressure on various species of gamebirds at various times in different regions of the Province.

Hunters are co-operating increasingly well in the returns project. After the 1975 season only 276 (8,6% of all licence holders) submitted their returns. This had risen to more than 1 800 (31,6%) for the 1979 season and the returns are still streaming in at present. With co-operation such as this from hunters, increasingly meaningful results will be obtained from the returns in years to come.

The landowner-hunter who hunts on his own land needs no licence and therefore submits no return. On account of this, the hunting pressure exerted by landowners on gamebird populations is a completely unknown factor at this stage and will have to receive attention in future.

Another problem is the current lack of reliable biological data on the distribution of various gamebird species in the Transvaal, the ecological requirements of each species, the quantitative effect of various habitat manipulation practices on populations, and the annual breeding success of each species in different regions of the Transvaal. Ongoing research will eventually supply the answers and a core of reliable and conservation-conscious hunters and landowners can, by supplying certain information to the Division, make a tangible contribution to Transvaal gamebird management.

One of the most pressing problems has been a lack of information on the average gamebird hunter — his habits, requirements, attitudes, and the problems he encounters in practising his sport. To rectify this situation, Mr Julien Cadieux, as the officer responsible for outdoor recreation research, is launching a comprehensive survey. Each hunter who takes out a hunting licence for birds in 1980 and 1981 will receive a questionnaire. The object is not to make the hunter reveal facts about himself which can be used to his detriment, but to encourage him to yield information voluntarily which will make an objective assessment of the "average" gamebird hunter possible. Hunters can give information freely and all information will be treated confidentially.

Once the study is completed, the appropriate recommendations to cater for the needs of the hunter can be made and incorporated in the management plan.

Gamebird hunters have, as a group, always been responsible and conservation-conscious. Full co-operation between the Division and hunters can only lead to better management of the resource, resulting in viable gamebird populations, high-quality hunting and informed, responsible and happy hunters in years to come.

CONSIDER BEF

RE YOU BURN!

Lorna Stanton

The devastation caused by an uncontrolled fire may take many years to recover.

The influence of veld fires on the environment

N H G Jacobsen
Senior Professional Officer

Winter, with its grey skies, is now commonly associated with veld fires which ravage the countryside at that time of the year, leaving what was before a smooth yellow-brown slope, a ragged and ugly black. No life is apparent, with the exception of pied crows foraging for the burnt carcasses of small animals killed by the passing flames. A desolate landscape.

Veld fires are common on the African continent and have always been a part of the natural scene. This is clearly evident in the fact that many plants (pyrophytes) have become fire-adapted and in fact some, such as the fire lilies *Cyrtanthus* spp. and *Anoiganthus* spp., and the beautiful grass aloe of the eastern mountains *Aloe chortolirioides,* do not flower except after a fire. Drastic changes have taken place through the centuries, however. In the past, fires were of a seasonal and periodic nature as opposed to the present. Nowadays, regular annual burning takes place in many areas to destroy insect pests and to provide grazing for livestock unable to utilise the grasses in their mature stages.

Accidental fires might be started by lightning and numerous examples in the higher-lying areas of the country attest to this. Such fires may burn until they extinguish themselves in some green meadow or are drenched by a storm.

Man, of course, learned from this and manipulated fire to suit his own needs. Prehistoric man used fire to kill game by surrounding a herd and setting the grass alight, thus burning the animals to death. Such slaughter was once commonplace. This technique is still practised in Africa, and until quite recently, the Ila people of the Kafue flats performed their ritual lechwe hunt in this manner. Smaller hunts of this nature occurred in most parts of Africa, including the south; but apart from this, burning was practised widely to provide green grass shoots for livestock.

With the coming of the White man and an accompanying increase in population, the land was divided up. More intensive farming systems developed with a corresponding increase in the number of fires, both accidental and non-accidental, which were allowed to burn unchecked. Today, fires are rife and many areas burn on an annual basis, some even twice a year.

The effect of this increased burning over the years can be seen in our countryside, which has established a fire climax. This means that the vegetation is kept at its present level by fire, and in the case of the Highveld, is kept as a grassland because fire prevents the germination and growth of trees. Fires are very destructive when burning takes place during the winter months and trees such as proteas are especially susceptible. The species composition and structure of the herbaceous layer also changes, mostly for the worse as unwanted species may invade. Fire has therefore been largely responsible for the veld we see today. One has only to look at areas in

the eastern highlands, where montane forests present a marked contrast to the surrounding grasslands, to appreciate its affect.

The effect of this repetitive and uncontrolled burning is therefore felt most in grassland. If one considers that the Highveld vegetation, which as such represents a fire subclimax, is due mainly to man's activities, then maybe one can appreciate how destructive a force it can be.

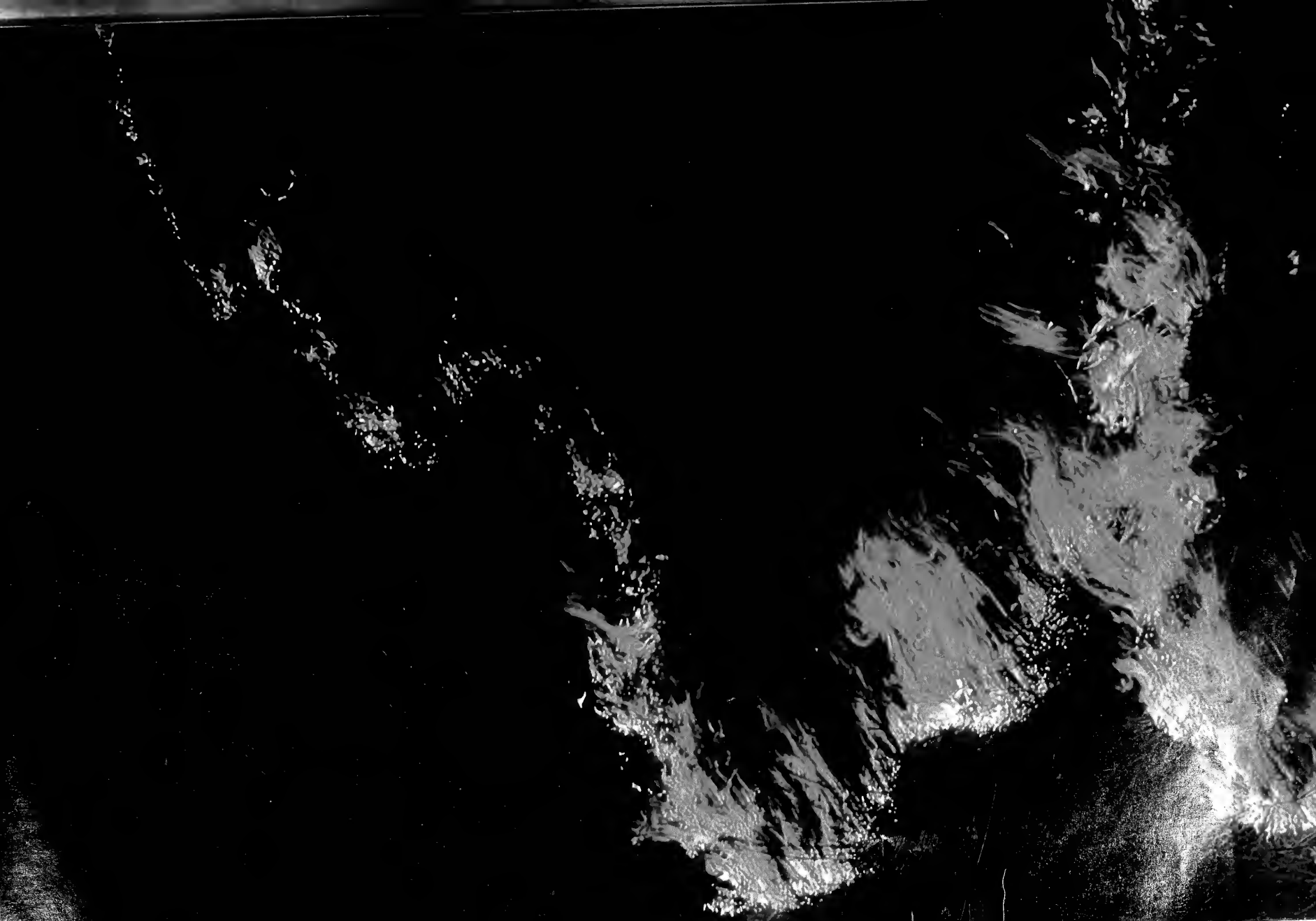
The destruction is proceeding at an increased rate. Urban people with no regard for life indiscriminately, irresponsibly, accidentally and deliberately set the veld alight in winter. Some may build a fire purely to warm themselves while waiting to be picked up, thereafter leaving the fire to spread into the dry grass. No firebreaks are made to stop the ravaging flames, which may reach a height of several metres in tall grass country, and travel with the wind, burning and killing everything in their path.

During trials in the Kruger National Park, it was found that the species composition of small mammals such as rats, mice and shrews changed drastically after a fire and it was only after several years of protection that it returned to normal. Small mammals such as rodents have a high reproductive potential which can be realised under optimum conditions, but what of a species such as the pangolin which produces a single young, or on occasion two, per year? What chance has it of surviving the holocaust?

If ever you have to burn veld, obtain the advice of experts on when and how to burn, rather than burning indiscriminately. There has been a large amount of research on the subject and only gradually are we becoming aware of how, with fire on a controlled basis, the veld can be managed to the benefit of all creatures, great and small, including ourselves.

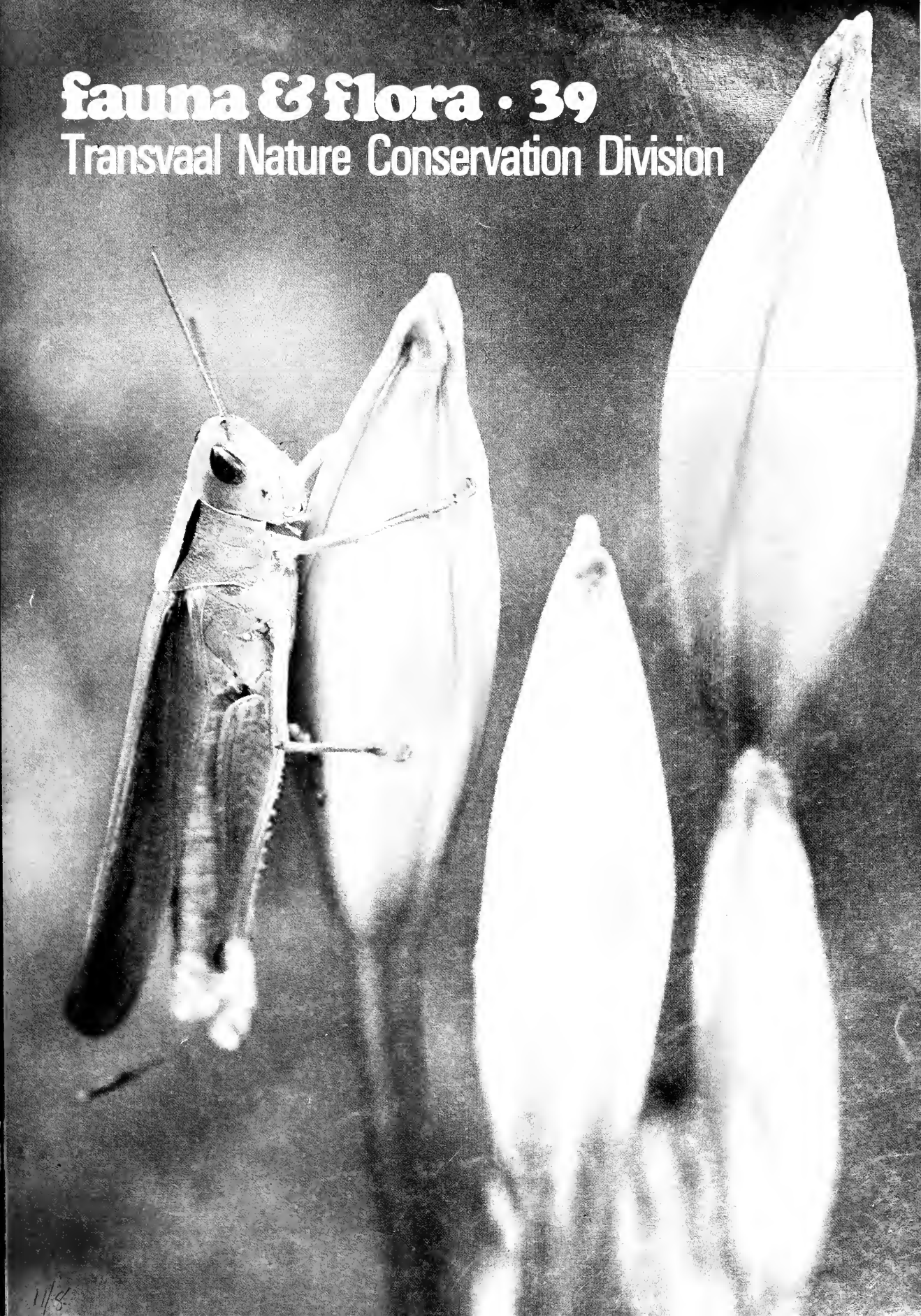
N H G Jacobsen

Veld fires can have positive effects. *Anoiganthus brevifloris* only blooms after a burn.



fauna & flora · 39

Transvaal Nature Conservation Division



fauna & flora

NUMBER 39 • 1982

CONTENTS

Conservation - a question of changing human values 2
The backpackers' code 7
Improved transport technique for giraffe 12
Clarias - the hyena of our rivers and dams 14
The black eagle 16
Snares and traps - the scourge of wildlife 20
Flora conservation in Transvaal 23
Reorganisation of Nature Conservation Division .. 26

Front cover: *Paracinema tricolor* on *Crinum* sp.
Back cover: Tierkloof, Rustenburg Nature Reserve

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CONSERVATION

Chris Nel

As he speeds headlong towards the 21st century, modern man is rediscovering certain fundamental truths about his relationship with the environment. These were without a doubt well known to his ancestors, at a time when man lived close to the earth and life was far less complicated. The hard, cold fact that the planet earth can be likened to a space ship, with certain built-in life-support systems on which all life is dependent, was clearly brought home to hundreds of millions of people as a consequence of space exploration of the past two decades. Our natural resources, once thought to be infinite, are now clearly recognised as being exhaustable, with all life forms inseperably linked together by the cycles of water, oxygen, nitrogen, carbon dioxide, minerals and energy that are uniquely characteristic of earth.

Man is only one of a vast multitude of species inhabiting the planet, and is as dependent as any of them on these systems. Like all other species, man interacts with and has the ability to adapt to his environment. But he is the only species which has developed the ability to appreciably and deliberately modify his environment to suit his needs, thanks to his ability to record and communicate complex information, his opposable thumb, and his (mostly) co-operative nature.

In primitive man, this ability was limited mainly to the use of fire, which even today shapes much of the landscape. At a later stage in his development wild herds were domesticated and man the hunter-gatherer had become man the pastoralist. The next step was the discovery that the planting and tending of seeds was a good way to increase the amount of food available and the agricultural revolution, which continues to this day, was born. The cultivation of crops required a settled life style, and settlements grew to towns, towns to cities, cities to city-states, and city-states to empires as commerce, industry, science and the arts flourished. Despite droughts, famines, natural disasters, pestilence and war man kept adapting and developing and his population slowly but steadily increased as he spread and colonised the entire planet.

The industrial revolution in the eighteenth and nineteenth centuries marks the onset of a dramatic change in man's relationship with his environment. Our sophisticated technology today gives us a hitherto unheard-of ability to mould and modify our environment to suit our needs. And this ability is not always used with wisdom and humility, but often wielded with an arrogance befitting our self-styled image as rulers of nature, which would make our ancestors (and descendants, if any) wince.

We are today capable of obliterating all life on earth, including our own, in one brief searing conflagration, literally at the touch of a button. We have the ability to flatten mountains, and create mountains where none existed before. We dump hundreds of millions of tons of fertile topsoil into the seas, at the same time spending vast amounts of money to reclaim land from the very same seas for development projects. We poison the air, water, soil and the very web of life on which we are dependent with a cocktail of highly persistent synthetic biocides, without being able to predict the consequences. We can

A Question of Changing Human Values

drain marshes, flood land, divert rivers and create artificial impoundments so large that the tidal effect is clearly visible. We can descend into the deepest ocean troughs, and fly so high that we escape the earth's gravitational pull. We have the ability to exterminate entire species, genera or families, seemingly with little more concience than a shrug of the shoulders. We uproot and destroy communities of plants and animals inhabiting a piece of land since time began, and replace them with monoculture systems of our own design, enforcing equilibrium by means of sophisticated agricultural machinery and liberal applications of chemical fertilizer, fungicide, herbicide, insecticides and rodenticides. We introduce exotic species seemingly at whim, wreaking havoc with vulnerable island ecosystems. We destroy millions of hectares of rainforest and cover millions of hectares of land with a carpet of concrete and tarmac, all in the name of progress. We affect the global composition of the earths's atmosphere, heralding unpredictable climatic changes. We can even alter the energy equilibrium of the planet with our nuclear power stations, with consequences that no one can accurately predict. The list goes on and on.

The abovementioned facts should be viewed objectively. We must be careful not to judge them as either "good" or "bad" lest we end up with a grossly overinflated opinion of our own prowess, or a feeling of guilt, remorse or holier-than-thou. All of these are in the long run destructive. Man's history, achievements and abilities should perhaps rather be seen as the inevitable outcome of the powerful natural forces of evolution, adaptation, competition and survival.

These forces have thus changed man, during his brief tenure on earth, from being one with nature to being its

"We dump hundreds of millions of tons of fertile topsoil into the seas . . ." Soil erosion on the Madlangampisi, South-eastern Transvaal.

LORNA STANTON

". . . short-term self interest is often at loggerheads with the principles of conservation." Grassland being burnt to provide fresh green grazing for sheep.

undisputed master. His phenomenal population growth (from 4 000 million in 1975 to a projected 6 350 million in the year 2000) testifies that he is, at least temporarily, one of the most successful species this planet has yet known.

And in this success lies the seeds of his downfall. As the human population grows, ever-increasing stress is being placed on the environment as natural resources are depleted or despoiled at a terrifying rate. Without going too deeply into the depressing details, a few facts may be mentioned.

In the early 1970's one hectare of arable land supported 2,6 persons but by the year 2000 it will have to support four persons. The increase in food production will mostly come from increasingly intensive use, including such energy-intensive imputs as chemical fertilizer, mechanisation, irrigation, pesticides and herbicides — in many cases with eventual diminishing returns and adverse environmental effects. As most arable land is already in use, only some 4% increase in the area of land under cultivation is possible. Present loss of productive land due to desertification, on the other hand, amounts to some 6 million hectares per year. The world's forests are being destroyed at the rate of 18 to 20 million hectares a year, mostly representing the tropical rain forests of Africa, South America and Asia. At this rate 40% of the forests still remaining in the developing countries today will be gone by 2000, resulting in serious damage to the oxygen cycle, one of the primary life-support systems. In the year 2000, the predicted global concentration of carbon dioxide will be 30% higher than pre-industrial levels. Several hundred thousand tons of highly radioactive spent nuclear fuel will be generated over the lifetimes of nuclear reactors likely to be constructed by the year 2000. Some by-products of reactors have a half-life approximately five times as long as the period of recorded history, and it has not yet been proven that these wastes can be safely stored and disposed of without incident. And finally, at least 500 000 species will become extinct during the next two decades — a loss of 15 to 20% of the earth's total plant and animal species. One-half to two-thirds of the extinctions will be a result of clearing or degrading tropical forests, but practically all will be as a result of some form of habitat destruction or from pollution.

It has taken long for the realisation to dawn, but it is clear that if present trends continue man's survival, not to mention the quality of life, will be at stake. Leading academics, philosophers and decision-makers are today re-examining the basic concept of "progress" and questioning whether it is necessarily the same as "technological progress". Technology is but a means to an end and not an end in itself, and the wisdom with which it is used will determine our future. In other words, man's attitude towards his population growth, his abilities, his environment, his fellow man and his fellow creatures will shape the world of the year 2000 and beyond.

A serious problem in achieving a balance between man's short-term interests and long-term survival prognosis is the abysmal lack of awareness of environmental matters among the mass of the world's population. Equally serious is the unwillingness of certain decision-makers to

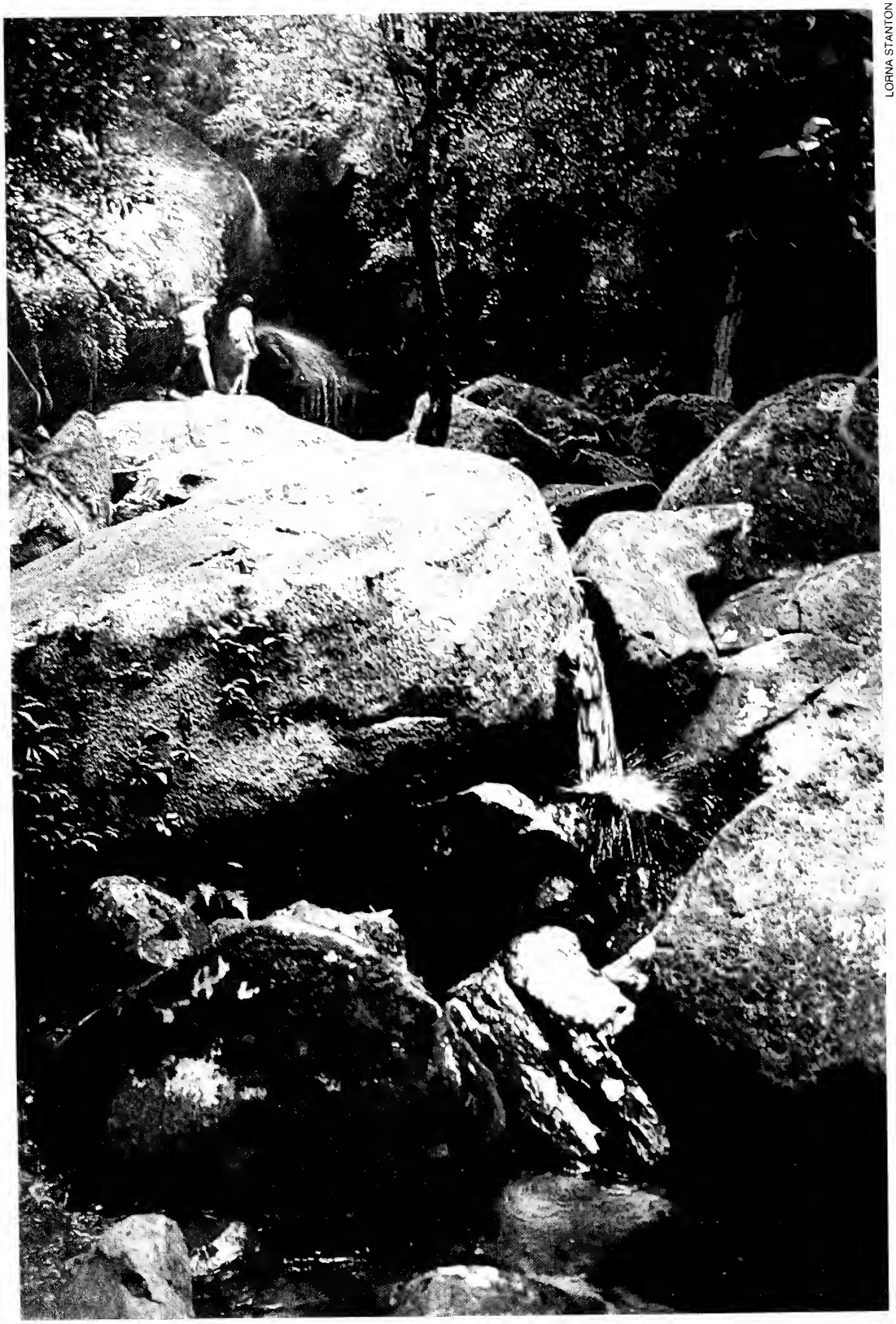
make short-term sacrifices in order to ensure the future. Self-interest is one of man's basic driving forces, and short-term self-interest is often at loggerheads with the principles of conservation.

But man is unique among all life forms in that he can foresee the consequences of his actions and plan accordingly. He is also unique in showing concern and compassion for his fellow creatures. And in this lies the challenge of conservation education — to canalise the human power of reason and man's altruistic traits into a certain direction for the common good. In short, changing human values.

As the official publication of the Transvaal Division of Nature Conservation, *Fauna & Flora* is charged at the same time with the tremendous responsibility and privelege of contributing in its modest way towards the conservation education of the people of Transvaal. It features articles on a wide spectrum of environmental and conservation topics, contributed by many different authors. It aims to inform, persuade, enlighten, shock if necessary and to educate, but never to bore and always to remain eminently readable.

"We poison . . . the very web of life on which we are dependent with a cocktail of highly persistent synthetic biocides . . ." Industrial pollution near Pretoria.

LORNA STANTON



LORNA STANTON

". . . man's attitude towards . . . his fellow creatures will shape the world of the year 2000 and beyond." Montane forest on the slopes of the Madlangampisi.

The Backpacker's Code

Geoff Cowan

"WALK LIGHTLY"

The *Sierra Club Guide to Backpacking* defines the backpacker's behavioural code in the following way: "You choose your route, your gear, your destination with the welfare of the wilderness in mind. You camp and travel by the rules of 'low impact'. The wrong way is any other way." The following guidelines to hiking behaviour are based on this code.

To "walk lightly" means that you should avoid kicking up soil and stones, as the soil you dislodge will wash away during rain or leave pockets of mud. Other hikers will dodge them, creating new trails and increasing erosion and the formation of gullies. You should wear the lightest, softest shoes possible. Running shoes do far less harm to the environment than boots. Obviously there are times when you have to wear boots, but it is only at these times that they should be worn. The pack you carry should contain all the essentials, but at the same time be as light as possible. Not only does this make your load easier to carry, but lessens your foot pressure on the path. This in turn reduces compaction and later erosion. Walking quietly is also important. It increases the chance of seeing wildlife. Avoid clanging cups, shouts and loud conversation. Noise pollution not only scares wild animals, but is objectionable to others seeking solitude.

A working knowledge of trail behaviour and maintenance is important for any hiker. Short-cutting switchbacks increase the trail's gradient, which in turn increases the erosion potential. Laid-out trails usually take low impact routes, and deviating from them increases the impact. In areas where the trail is not marked, the hiker should avoid walking along ecotones. An ecotone is the transition zone between communities (for example the forest edge). These areas usually have the most fragile vegetation and can take up to 25 years to recover after human trampling. Areas with very little or no vegetation are extremely susceptible to erosion. Scree and talus slopes should be avoided for the same reasons. Hiking across them creates miniature landslides, which destroy any vegetation growing in exposed areas. Without the vegetation the soil does not stabilize. Rolling rocks down slopes or over cliffs has the same effect, as well as being extremely dangerous to anyone below.

In most hiking areas streams are the only source of drinking water. Keep them clear by camping and washing well away from them.

TRANSVAAL NATURE CONSERVATION DIVISION

LORNA STANTON

On established hiking trails campsites with suitable facilities have been developed to reduce the hiker's impact on the environment.

Taking only photographs and leaving only footprints is the philosophy to follow. Leave items of interest (for example plants, animals and mineral specimens) where you find them in their natural state, so that others too may enjoy them. Cutting or painting messages or names on tree trunks and rocks is not leaving these things in their natural state. Removing anything is removing a link in the ecological web. Removing enough will cause the web to collapse. Disturb animals and birds as little as possible, particularly those with young or in nests. An abandoned young bird or animal has far less chance of survival than one with full parental support. On the other hand, leave any seemingly lost young animals well alone. Their parents have probably hidden them on purpose, in order to return and fetch them later. By removing the youngster from its home environment you are again decreasing its chances of survival, in addition to contravening the Nature Conservation Ordinance. Feeding wild animals can be dangerous, both to you and the animal. You may pass harmful bacteria on to the animal through your food, or the animal may get a fright when it suddenly realizes how close it is to you. Frightened animals often bite. An animal which is often fed develops a dependence on humans, which can lead to drastic deviation of the normal behaviour, again possibly decreasing its chance of survival.

Take a refuse bag with you and use it. Carry out anything you have not eaten. Nothing should be left behind. Food scraps, such as egg and peanut shells and orange peels, take a long time to decompose and are eyesores to other hikers.

If you smoke, take care! Stop, sit down and relax! Don't smoke while hiking. Use a flat rock as your ashtray or dig down to soil level with your heel. Crush out your smoke, as a veld fire is a devastating force - don't give one a chance to start. Place the dead butt in your refuse bag. This is especially important if you smoke filter-tipped cigarettes. Most filters are synthetic and do not decompose.

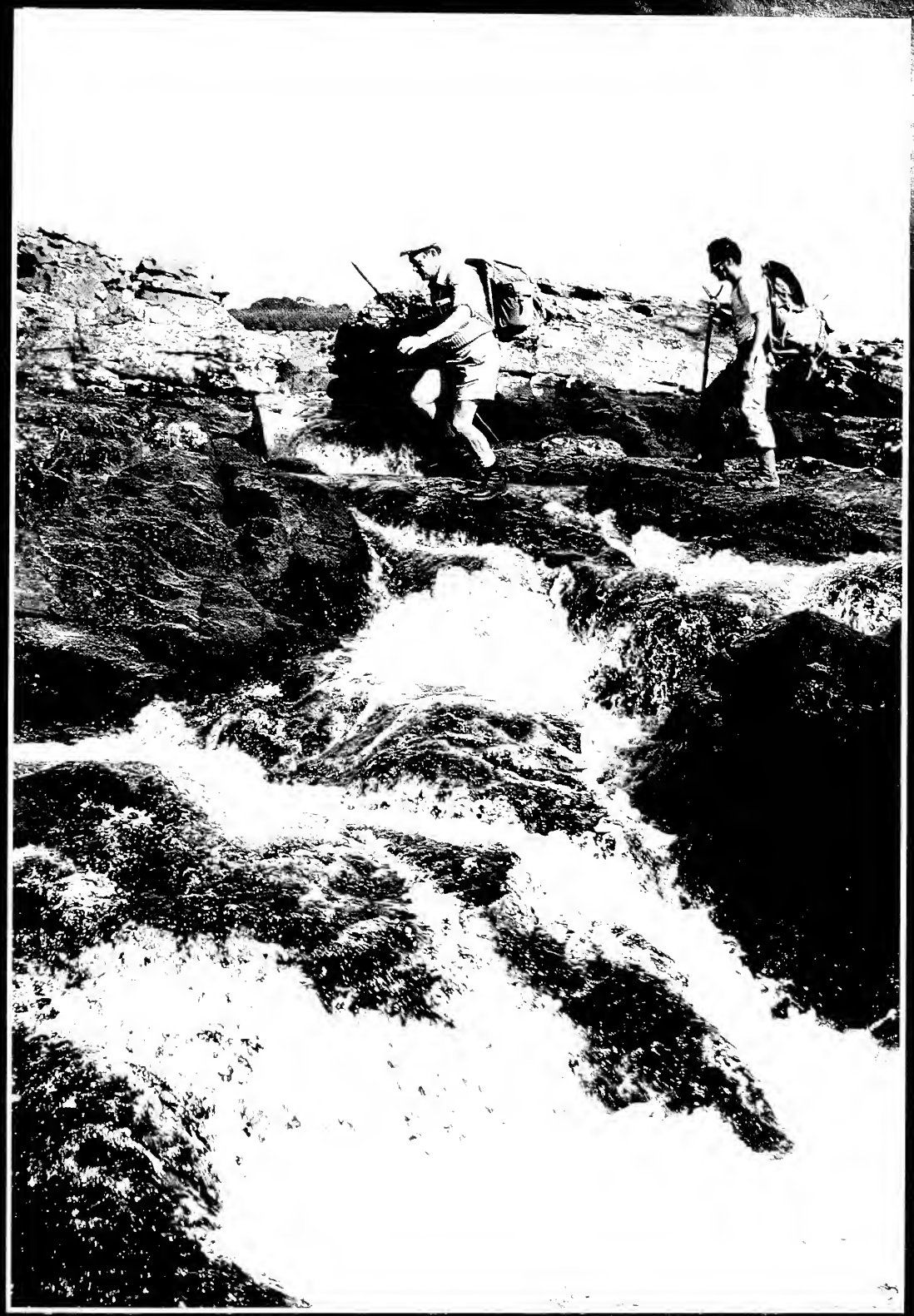
In areas which are intensively used, such as established hiking trails, campsites have been developed to reduce human impact on the environment. Use them and their facilities. There is usually a set place to make a fire. A toilet is usually provided. If not, use the "cat method" for disposing of human waste. Select a level screened spot at least 50 metres from the trail or from water. Dig a hole no deeper than 15 to 20 centimetres (to keep within the biological disposal layer). After use, fill the hole with loose soil, replace the sod and tramp firmly. Nature will do the rest in a few days.

Don't break off branches from trees, shrubs or bushes. An area with discoloured and broken stubs and "pruned" trees loses its natural appearance. Decomposing logs provide nutrients to enrich the soil. They also provide shelter for seeds to germinate, young plants to grow and small animals to live in. At developed campsites, use only the wood provided for your fire, and use it sparingly. There are often limits to the amount that can be brought in, and it should not be wasted on large bonfires. If there is no wood supplied, use your backpacker's stove. Before you leave the camp, make sure your fire is dead, take all your litter with you and leave the camp clean, so that others may enjoy using it after you.

If the water supply is a stream, don't use soaps and detergents in it, not even if they are bio-degradable. Someone will possibly be using the water soon after you have left and the chances are that the soap may not have broken down yet. Use a bio-degradable soap and wash in a bowl at least 20 metres away from the water, and afterwards pour the soapy water on the ground. This will allow the soil to filter out the soap.

Consider others who may be camping near you. They might be camping to get away from the noise of people. Allow them to hear the sound of the bush at night.

When setting up camp in areas where there are no developed campsites, remember the rules of low impact. Disturb the area as little as possible. Avoid camping on



Ever-growing numbers of hikers are looking up the fast-disappearing wilderness areas, and this places an increasing strain on the environment.

an ecotone. Select a site at least 60 metres from the trail, any water and any beauty spot. Make sure your campsite is level — not only for comfort but for ecological reasons as well. Sloping ground erodes easily. Do as little camp "improvement" as possible. If you pitch a tent, dig drainage channels only if really necessary. Carry a sleeping mat with you, rather than cutting vegetation for a mattress. If you have to do any clearing at your campsite, scatter the cleared stones, and branches back over the area when you leave. Try to leave no trace of your having occupied the area.

Open fires should be avoided, as they scar the landscape. The mark of an experienced backpacker is to use a stove when wood is not readily available or when an area could be easily damaged. If you do make a fire follow these rules:

1. Select a site on level ground, sheltered from high wind and away from heavy bush, logs, tree trunks, overhanging branches, grass and any other potential fuel.
2. Clear the ground down to soil level to ensure that your fire cannot escape.
3. Keep your fire small to conserve fuel.
4. Never leave your fire unattended.
5. Keep water handy.
6. When you break camp, put your fire *dead out*. Drown it with water, stir the coals and drown again. Then cover the coals with sand.
7. Anytime you light a match make sure that it is out before you place it in your litter bag. Never throw it away..

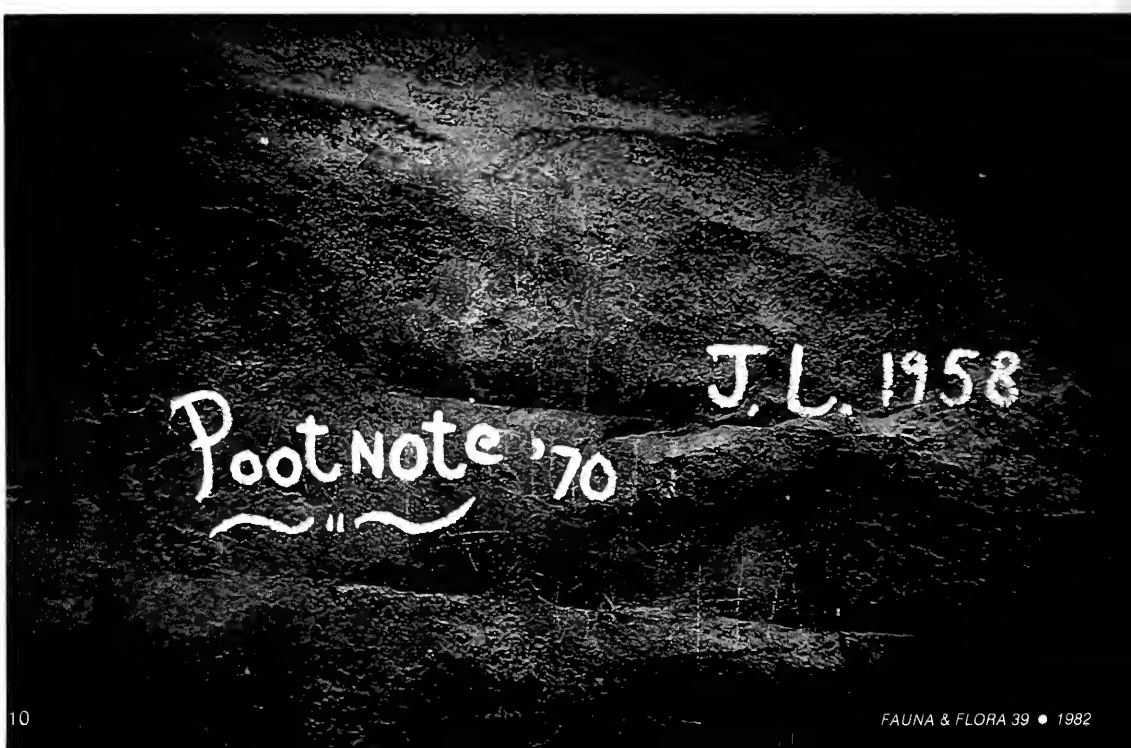
Be aware of and comply with all the rules and regulations in force in the particular area, or on the trail on which you are hiking. These have not been formulated to curtail your freedom to enjoy the outdoor experience, but to guarantee it.

People, in ever-increasing numbers, are wanting to experience the fast disappearing wild areas. If we wish to continue being able to enjoy what is left of them, we should all adopt Aldo Leopold's self-imposed challenge to "think like a mountain". In doing so we will begin to understand both the diversity and the fragility of nature and the need to protect it.

THE FOLLOWING RULES ARE OF NECESSITY STRICTLY ENFORCED ON ALL NATURE RESERVES UNDER THE CONTROL OF THE TRANSVAAL NATURE CONSERVATION DIVISION:

1. Entry without written approval is prohibited.
2. Lighting fires other than in designated sites is prohibited.
3. Firearms are prohibited.
4. Pets are prohibited.
5. Throwing away a burning object is prohibited.
6. Littering is prohibited
7. Enticing, feeding or disturbing of wildlife is prohibited.
8. Pollution of water is prohibited.
9. Picking of flowers or damaging of plants is prohibited.
10. Use of habit-forming drugs or substances is prohibited.
11. Removal of geological, historical or archaeological material is prohibited.
12. Defacing or marking of natural or man-made objects is prohibited.
13. Driving or parking of any private vehicle, other than on designated roads or parking areas, is prohibited.
14. Rolling or throwing rocks down slopes is prohibited.
15. Causing excessive noise or disturbance is prohibited.
16. Holding or addressing of public meetings is prohibited.
17. Distribution of handbills or printed matter is prohibited.
18. Collecting of money from the public is prohibited.
19. Trading is prohibited.
20. Public entertainment is prohibited.
21. Camping, other than at designated sites, is prohibited.

Painting names or messages on rocks is not leaving them in their natural state.



TRANSVAAL NATURE CONSERVATION DIVISION

TRANSVAAL NATURE CONSERVATION DIVISION

"Think like a mountain"

Aldo Leopold (1887-1948)

Improved Transport Technique for Giraffe

R Parris • J D Roos • J C F Heydenrych

Every year since 1962, the Transvaal Nature Conservation Division has captured a number of young giraffe for relocation on provincial nature reserves and private land. Due to foot-and-mouth control measures, the animals must be kept in quarantine pens on the Hans Merensky Nature Reserve near Tzaneen for a specified period, before they are distributed.

In the past, the giraffe were transported to their final destination in specially constructed single crates after the expiry of the quarantine period. Various problems were experienced with this method, especially in the transfer of the giraffe from the quarantine pens to the transport crates. At times this resulted in injury to an animal, since it had to be caught by means of a catch-pole and noose. Once in the crate, the animal had to be strapped in a standing position by means of a girth and rope to prevent it from leaping backwards and upwards or lying down, because if it lost its balance and fell it would not be able to regain its footing in the confinement of the crate. The animal therefore had no opportunity to lie down even if it wanted to, and was exposed to sun, wind and rain during the journey.

In 1974 research was initiated to develop a loading and transport technique which would eliminate the above-mentioned problems. During the trials, a covered trailer was positioned in front of the quarantine pen. Fodder was placed in the trailer, in order to lure the giraffe inside. Within a few days the giraffe had become so accustomed to the trailer that it was possible to close the trailer door and, using a tractor, haul the trailer away with the giraffe inside.

The giraffe was then transported to a nearby game camp where it was released. This method was subsequently used to transport two giraffe together, with promising results.

A private game-trapping company had in the meanwhile also successfully transported giraffe in a converted furniture van. It was thus clear that this approach justified further consideration.

In 1979, the Transvaal Roads Department undertook to convert an old library van (drawn by a mechanical horse) to a giraffe transport vehicle for the Division's use. The van had a transverse partition (approximately the height of a giraffe's shoulder) in the centre, dividing it into two compartments. The feeding and water troughs were attached to the top of the partition. Two giraffe could be loaded into each compartment, with enough space for both animals to lie down, move and turn around in. The transport van had two sliding doors on the side, one for each compartment, to facilitate loading and unloading. The wooden floor of the van was covered with a plaited rubber mat and sawdust to prevent the animals from slipping.

A few days before the giraffe are to be transported the transport van is parked in front of the quarantine pen, so that the sliding door of one compartment is directly opposite the door of the quarantine pen. Both doors are opened and connected by a short passage. Feeding the animal in the quarantine pen is stopped, and fodder and water is placed in the transport van to lure the giraffe inside. Normally the giraffe becomes accustomed to the van within a day. The engine of the mechanical horse is started from time to time to acquaint the giraffe with this strange new sound.

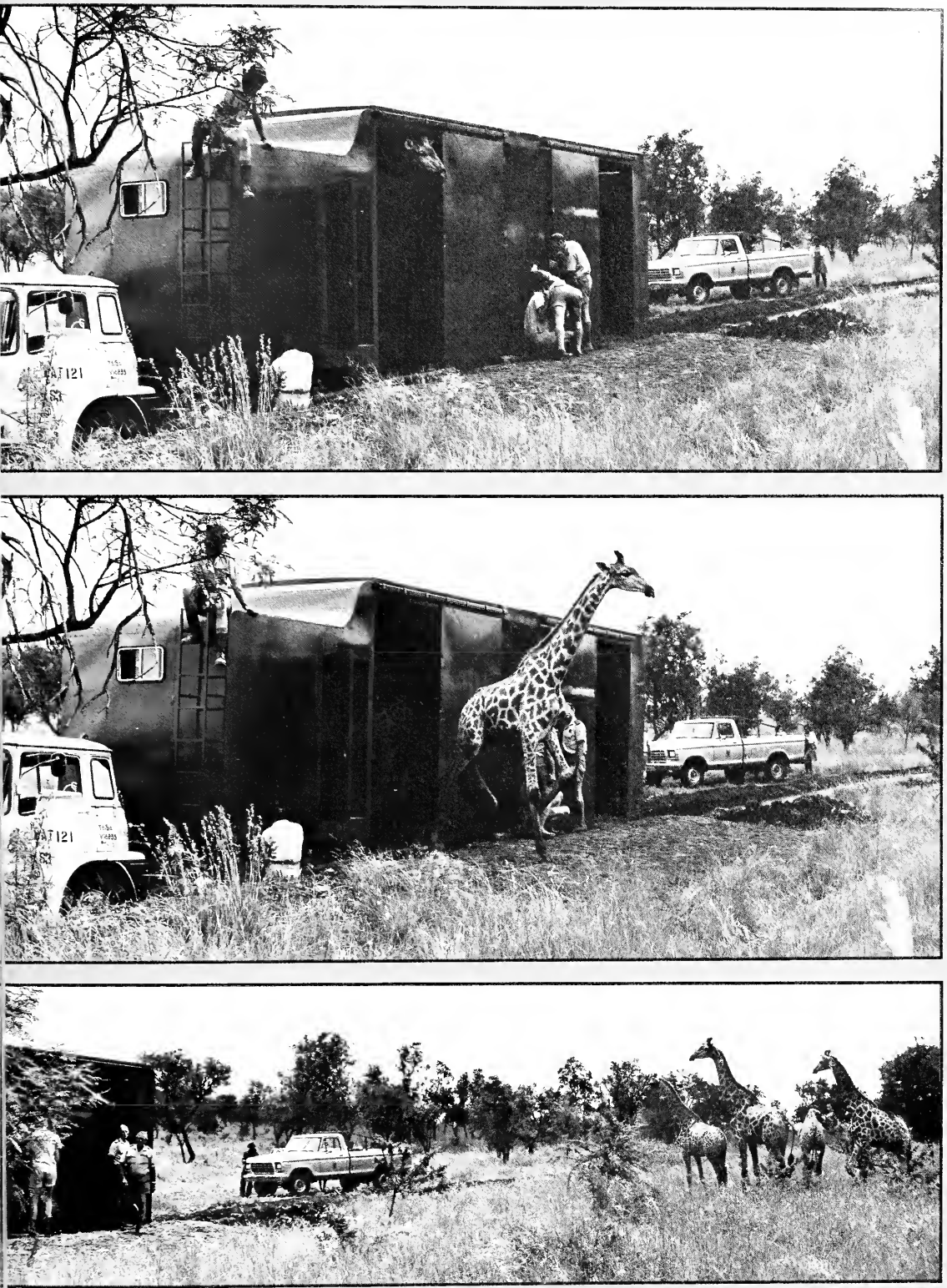
On loading the van, the sliding door of one compartment (A) is closed. That of the other compartment (B), directly opposite the door of the quarantine pen, is opened to allow two giraffe in the pen to enter. Door B is then closed and the van is moved so that door A is opposite the door of the pen. Door A is opened and the other two giraffe enter compartment A. The whole loading process can be handled by one person.

The maiden voyage of the van was to the Doorndraai Dam Nature Reserve and lasted about five hours. The four giraffe were calm and even ate during the trip. Four more animals were transported to the reserve a week later. Two groups of giraffe were subsequently transported to Itala and Weenen Nature Reserves in Natal. These two trips lasted approximately 15 hours and were undertaken at night.

During the first trip no illumination was provided inside the transport van. It was however observed that the giraffe were calm and ate and even lay down at times. Before the second trip two fluorescent tubes were fitted to the inside roof of the van and were kept switched on during the night of the second trip. These did not disturb the giraffe and had the advantage that the giraffe could be observed from the cabin through a wire-mesh door. They were again seen to lie down during the journey.

This new transport technique has certain advantages for the animals, when compared to the old single-crate method. They are protected against wind and adverse weather conditions. They are transported and released as a group, which is important in the case of such a social species. They are able to eat and drink, to lie down and move about, which is of great benefit on long journeys. If mechanical problems are experienced *en route,* the animals can be kept in the van for an indefinite period without any complications.

Now that a number of journeys have been successfully undertaken, it is clear that the new transport van of the Division makes the moving of these valuable animals easier and safer.



DICK CARR

The release of the first group of four giraffe on the Doorndraai Dam Nature Reserve. It is evident that the animals are completely at ease.

CLARIAS –

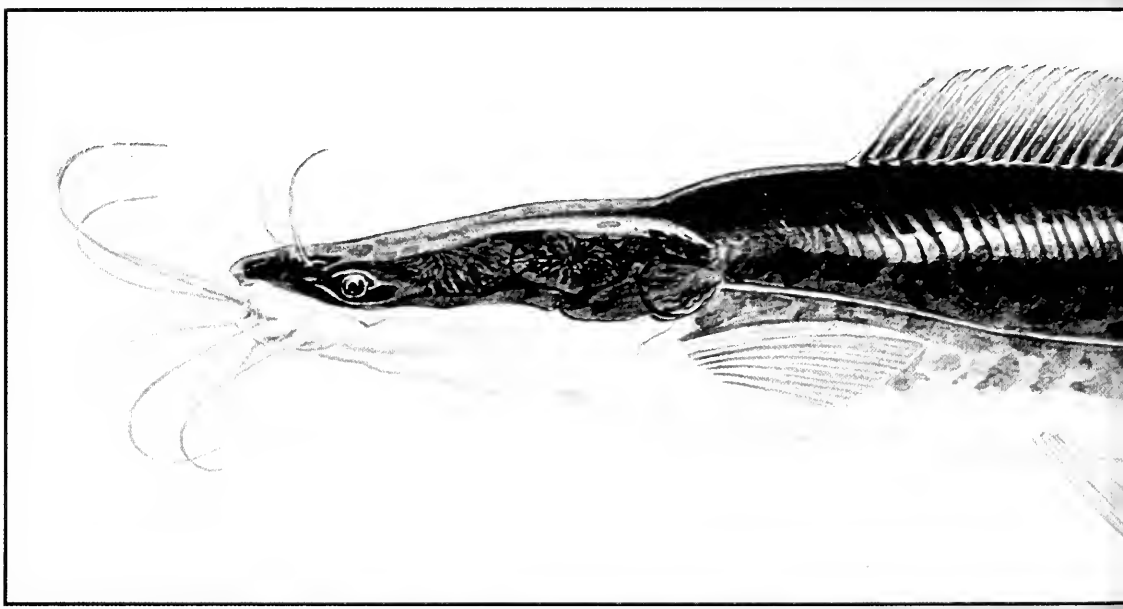
The Hyena of ou

The fish family Clariidae, represented by the airbreathing catfish or barbel, is a conspicuous part of African freshwater fauna. The members include the monstrous vundu, which inhabits the larger rivers in North and West Africa, and the remarkable 15 cm long catfish of the dark dolomitic Aigamas Cave near Grootfontein in South West Africa, which feeds on the excrement of baboons sleeping in the cave. Being typical fish, members of this family breathe with the aid of gills, but are also equipped with well-developed auxiliary breathing organs to utilize atmospheric oxygen. The spongy suprabranchial organ, situated at the back of the head, is in fact a modification of part of the gill-chamber, serving as a type of lung. The sharptooth catfish or barbel *Clarias gariepinus* is the best known member of the family in South Africa, and is common from the headwaters of the Blue Nile in East Africa to as far south as the Orange River system.

The barbel has an ungraceful appearance but a highly functional body design. The head is large, flat and heavily armoured with superficial skull bones. There are four pairs of well-developed barbels, the mouth is wide and the eyes are unnaturally small and bead-like. Scales are absent, the body is elongated and the dorsal and anal fins, composed entirely of soft rays, extend nearly to the tail. We distinguish two main colour types. One has a uniform dark brown upper surface, extending over the flanks onto a white throat and belly. The other has this area covered with irregular blotches, but also has white underparts. The colour is influenced by water clarity and type of river bottom — specimens from turbid waters tend to be lighter in colour. The barbel is undoubtedly the largest fish in our waters. In 1898 a monster weighing 59 kg was caught in the Vaal River near Christiana. It was over 2,1 m in length and the skull measured nearly 60 cm across - similar specimens possibly forming the basis of the "Loch Vaal Monster" sightings reported from time to time.

Barbel are generally not powerful swimmers and prefer the quieter stretches of rivers or dams, but can adapt to almost any type of water. Due to their air-breathing habits, they are well known for the adverse conditions under which they can live. They appear to survive quite lengthy periods encased in thick viscous mud, and are reported to be a nuisance in sedimentation tanks of large sewage works. Anglers are familiar with the rising and snapping for air at the water surface. Should a mature active fish be prevented from gaining access to the water surface, it could suffocate as the gills may not be able to extract sufficient oxygen from the water for normal living requirements. A not so common sight is the excursions that barbel undertake overland during wet weather. Though the fish is reported to survive out of the water for 24 hours, it is doubtful whether it could travel far overland by this erratic method of locomotion, supported by its spined pectoral fins.

With its wide mouth, *Clarias* is well equipped for a predatory way of life but is also considered as an omnivorous scavenger, feeding on practically anything that comes its way. Snakes, frogs, small crocodiles, fish, snails, aquatic insects, seeds, fruit and berries all form part of the endless list in its diet. Attracted by the rich ex-



Rivers and Dams

F de W Brandt

crement, they often concentrate under heronries and are quick to gobble up unhatched eggs and fledglings dislodged from nests and regurgitated fish dropped by birds. Barbel generally catch their prey by surprise rather than pursuit. They are also known to hunt in packs, often shepherding shoals of fish into the shallows, or lying in wait where floodplains drain back into rivers to scoop up small fish. The prey is swallowed whole. The whole procedure is accompanied by a loud slapping and snapping on the water surface which can be heard from a considerable distance. They are reported to explore and probe the upper surface of floating plants or logs with their long barbels for frogs and insects. They also feed on carcasses in or near the water, but it is inconceivable that they would wander far from the waterline to indulge in the practice.

Breeding takes place during the rainy season, and during this time mass migrations of barbel can often be seen swarming in shallow water and marshy areas to reach inundated grasslands to spawn. During these migrations predation and illegal fishing with spears and clubs extract a heavy toll. Barbel exhibit a spectacular mating behaviour, and the eggs are fertilized in the water and attached to plants and debris by an adhesive disk.

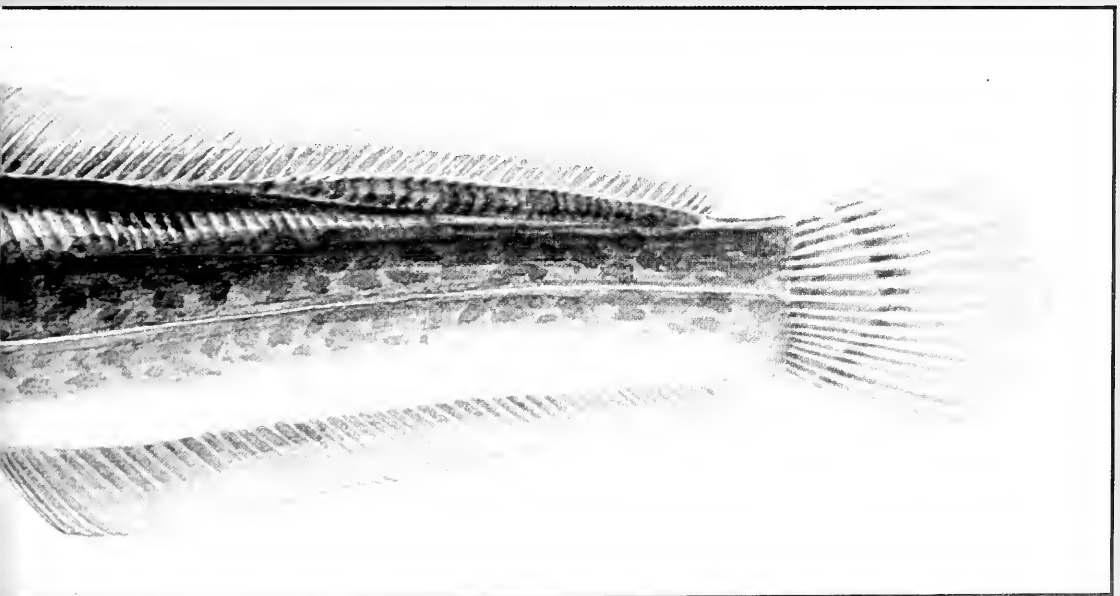
Development of the eggs is rapid and they hatch within thirty-six hours. One female can produce up to 50 000 eggs, and as a result of their successful biology, barbel are often the first to inhabit ecologically new areas. They are then able to survive dessication by burrowing into bottom sediments, or by vacating drying pools.

Though similar in appearance, *Clarias gariepinus* is not related to the pond-reared channel catfish *Ictalurus punctatus* which in 1973 showed a total retail value of 60 million dollars in the U S A. The possibility of farming *Clarias* was investigated at the Lowveld Fisheries Research Station at Marble Hall, but several problems, such as cannibalism, survival and feed formulation, remain limiting factors. The meat is red, of good quality, rich in oil and has few bones.

Clarias is not what might be termed a classical fighter, but it requires considerable patience and skill to land a heavy fish on a light rod and tackle as it uses its weight and strength in long dogged rushes. A spoon cast into hunting packs can provide thrilling sport, as a hooked fish will jump in an attempt to throw the spoon. A variety of other bait, from worms, chicken entrails, frogs, mealiemeal, spinners, wet flies or even blue-mottled soap, are all successful. The S A Open Tackle Angling Record of 31,8 kg was taken in the Vaal River in 1968.

Though the barbel is an extremely hardy fish, it succumbs easily to insecticides and other oil-soluble pollutants, as it must frequently rise to the surface for air-breathing. *Clarias* does not generally harass native angling species, but could be catastrophical if released in bass ponds, as the exposed nests and newly hatched fry form easy prey. Like the hyena, it is generally scorned at, but it certainly plays an important part in the ecology of the waters where it occurs - as predator and scavenger, and also as prey of other carnivorous species.

LOUIS STEYN



The Black Eagle

Chris Nel

> And then I saw it. No more than a tiny speck in the sky, smaller than the dot over the "i" in "tiny", it appeared to be stationary over the high mountain peak. It was black.
>
> John Awdrey Cottrell.

The family Accipitridae, represented by the kites, hawks, eagles and old-world vultures, enjoys a global distribution. It consists of 58 genera and 208 species, of which 48 occur in Southern Africa. The "true" or "booted" eagles are represented in Southern Africa by 11 species and five genera, of which the largest genus *(Aquila)* consists of five species. Of these, the black eagle *Aquila verreauxi* is the most spectacular, the most rapacious and, to the uninformed mind, the most notorious.

This magnificent bird occurs in suitable habitat from the Cape to the Limpopo and beyond to East Africa, Ethiopia and the Middle East. The distribution is closely related to that of the dassie *Procavia capensis*, which forms its staple diet. On account of its dependence on dassies and suitable nesting cliffs, its distribution is largely confined to open mountainous country, which offers both of these. It is a large and highly rapacious eagle, being the African ecological equivalent of the golden eagle *Aquila chrysaetos*, a bird found in Eurasia and Northern America.

The black eagle is one of the larger African eagles, sharing this distinction with the martial eagle *Polemaetus bellicosus* and the crowned eagle *Stephanoaetus coronatus*. A large female (female raptors are larger than males) may have a mass of up to 6 kg, measure 85 cm in length and have a wingspan of 210 cm.

In the field it is easily identified, even by a beginner, on account of its highly distinctive field characteristics. In the adult the plumage is predominantly coal black. The rump is snowy white and very distinctive in flight. When perched, the mantle and scapular feathers partly obscure the rump, forming a white "V" on the back. In flight the bird presents a distinctive silhouette. The wings are broadest from about two-thirds along their length, then tapering towards the wing-tip. The basal portions of the primary wing feathers are whitish and barred with blackish brown so that, when viewed from above or below, a large conspicuous paler "wing-window" near the carpal joint can be seen. As in all true eagles, the legs are feathered right down to the toes, which are butter yellow in colour, as are the eyebrows and the cere at the base of the bill. The bill and talons are blackish and the eyes are dark brown.

On leaving the nest, immature birds are physically quite as large as adults, but differ dramatically in appearance. The plumage is brownish above and blackish on the chest, with feathers in both cases edged with buff. The cheeks are black, with the crown and mantle a rich rufous. It shows the same wing windows as the adult in flight. The maturing bird goes through a sequence of annual moults, gradually replacing the immature plumage with mature plumage and assuming full adult plumage from approximately four years onwards.

Preying largely on dassies, the black eagle is somewhat of a specialist feeder. However, like most predators, it is at times inclined to be an opportunist, feeding on whatever may be most readily available. A long-term study in the Matapos National Park in Zimbabwe showed that dassies (99,9%) were almost exclusively preyed upon in that area. Other sources quote a figure of 80%. Prey such as hares, small antelope, gamebirds, small carnivores and young baboon are also taken when the opportunity arises and dassie populations are low. It is not above feeding on such lowly items as swarming termites, rodents and carrion when times are hard.

In black eagle country, the bird is most often seen soaring high overhead, or sitting on an exposed boulder in the early morning sun, one foot tucked up into the belly plumage, contemplating the infinite or occasionally preening. Black eagles form lasting pair-bonds and have strong attachments to their home ranges, staying together in the same area throughout the year. The presence of one bird in most cases means that its mate is not far away, and a thorough search of the landscape through a pair of binoculars would often reveal its presence. They are creatures of habit and have favourite perches and lookout points.

The flight of a black eagle is exceedingly graceful and never fails to instil a sense of awe in the observer. At the onset of the breeding season the male executes a spectacular aerial display. The bird rides the wind at a great height and then dives, with wings folded back, for hundreds of metres. Suddenly it levels out and sweeps upwards. With a few wing-beats its momentum carries it to

An immature black eagle. Note the colour pattern, as described in the text.

LORNA STANTON

its former height, where it swings over at the apex, sometimes with a body-roll or somersault, before plummeting down again. This course may be retraced time and time again, rising and falling like the arm of a pendulum. Sometimes the female may join the male in a mutual soaring display, or the male may dive at the female, who would turn over onto her back and present her claws to his. Black eagles have been seen locking claws and whirling downwards, but it is uncertain whether this was a display between members of a pair, or an encounter between two birds from adjacent territories.

These spectacular flights are mainly used in territorial display. Regular movements from one part of the home range to another are usually achieved with the minimum of effort, the powerful upward air currents created by mountain winds deflected off the slopes being used to gain the desired height with scarcely a wing-beat. Sometimes the birds seem to spend hours in the air with no real intention of hunting, solely for the sheer elation that is part of their complete mastery of the air.

A black eagle spends comparatively little time in the serious business of hunting. Being a highly efficient predator, it obtains its food with little difficulty, especially if it is plentiful. Hunting is done on the wing, the bird sweeping low along cliff edges, hugging the contours, and appearing suddenly over a ridge to catch its prey unawares. At times a pair may hunt together. To the observer it seems as if all the details of the attack have been carefully worked out beforehand, and are executed with split-second timing. The pair may separate, one bird drawing the attention of the prey, while the other slips away to launch the attack from the opposite direction a few minutes later. The prey is singled out and approached at high speed from a long distance in a low, slanting stoop. Maximum use is made of the wind, the contours and other natural features of the topography such as boulders, trees and bushes. Often the light is used to best advantage and the attack is made out of the sun, so to speak. The kill is lightning-quick, the dassie being whipped off the rock at 120 km/h or more, the bird scarcely checking its speed and stride while powerful talons quickly extinguish life.

The prey is carried to a convenient boulder where it is dismembered and eaten. A black eagle being a creature of habit, the diet can be accurately determined by examining the accumulation of prey remains below this "butcher's block" and regurgitated pellets of undigested material below the favourite perch. During the breeding season, especially when there is a nestling to be fed, the prey is normally taken to and consumed at the nest.

The breeding season of the black eagle starts in autumn. During this period there is a marked increase in display flights as territorial boundaries are reinforced and members of a pair can regularly be seen carrying sticks and other nesting material. Where sufficient suitable sites exist, a pair may have two or more alternative nests, and the same nest will not necessarily be used for two consecutive years. Nests are located on inaccessible cliff ledges and these are, according to indications, often

LORNA STANTON

The male contributes its part of the nesting duties.

LORNA STANTON

south-facing. When suitable ledges are not available, a large tree on a cliff face may be used.

The nest is a massive structure built of branches, sticks and twigs. It is used for many years, additional nesting material being added each time it is used. An old established nest may measure more than 2 m across and more than 2 m in height, although some nests are much larger. Nest sites are readily identified by the presence of "whitewash". The droppings of a black eagle are liquid in consistency and dry to a white powder, streaked with black. They are expelled, even by very young nestlings, in a thin, horizontal jet over the rim of the nest, thereby preventing fouling of the nest. The presence of fresh green twigs and leaves is an indication that the nest is in use, greenery being regularly added by the parents right up to the late fledgeling period.

Two, sometimes one, rarely three white eggs with a bluish tinge are laid at three-day intervals, from April to July. The incubation period is approximately 44 days. Generally the female does most of the incubation while the male hunts, but males additionally assist with all nest duties. The parents are close sitters and are not easily disturbed, although especially human disturbance at the nest during the critical period before the eggs are laid may cause the birds to abandon the nest entirely and not breed that year. This fact must be borne in mind by anyone planning to watch black eagles at the nest.

The eggs hatch two to three days apart. One egg is sometimes infertile, but when both hatch, a "Cain and Abel" relationship develops between the two nestlings. The older and stronger dominates and pecks its sibling into submission and eventual death within a few days. This process ensures the survival of one nestling, although it may seem cruel to a human observer. If the first egg fails to hatch or the elder nestling dies prematurely for some reason, the second is still there. No records of black eagles rearing two young to independence under natural conditions exist, although this may happen.

Upon hatching, the nestling is completely helpless and is covered by a fluffy white coat of down. During the nestling period of 95 days or more, the more typical contour and quill feathers gradually grow through the down coat.

No food is given to the nestling during the first 30 to 36 hours after hatching. Thereafter it is fed regularly, one tiny morsel of meat at a time, the gentle solicitous care of the parent being touching to observe. As the nestling grows (an amazingly rapid process) and gains strength and co-ordination, it starts feeding independently (at 40 to 45 days) on the prey supplied by the parents. In the early nestling period, the nestling is brooded or shaded by either parent, depending on air temperature and the presence of strong sunlight. As the thermo-regulatory powers of the nestling develop, this tapers off, the parents not brooding in daytime after three weeks. As it becomes older, the nestling becomes more active, daily increasing in co-ordination and strength. This is achieved by walking around in the nest, flapping its wings, preening, eating, playing with sticks, bones, leaves and other "toys" and generally keeping busy.

At the age of approximately 95 days the nestling has ac-

quired its full immature plumage, is fully grown physically, and has been becoming increasingly restless. The first flight is a critical moment, as it does not yet have the co-ordination and experience to fly far and execute a perfect landing. During this period and for some weeks afterwards, the parents are in constant attendance as the immature bird still cannot, of course, hunt successfully. During the following months, it gradually perfects its skills in flying, soaring, hunting and killing, accompanying the parents on hunting forays away from the nest.

From about five to six months after fledging it is ready for an independent life. It leaves the home range of its parents and roams at random, seeking its own territory. At approximately four years, it is sexually mature, having assumed full adult plumage. As for many other raptor species, records exist of black eagles breeding in subadult plumage.

Apart from baboons and crows, and possibly other raptor species which may raid the occasional unprotected nest, the black eagle has no natural predators or enemies. That is, with the exception of modern man. As it enjoys a wide distribution, it is one of the more successful large eagles. However, especially in sheep-farming areas, it has the reputation of being a sheep-killer and is consequently hard-pressed if not actually threatened. The Afrikaans name "lammervanger" (lamb-catcher) is colloquially used in many rural areas, but this refers to certain other large eagles as well.

The role of the black eagle in sheep-farming areas thus warrants closer scrutiny. It cannot be disputed that certain individuals may on occasion kill an unprotected lamb, especially during the lambing period and if this coincides with a shortage of its natural prey. During these times, however, black eagles will readily eat carrion, and the mere fact that a black eagle is seen feeding on a dead lamb does not necessarily implicate it as the killer.

Proper management of the lambing ewes should eliminate any black eagle predation problem that may exist. This would possibly include moving the ewes to a sheltered spot on the farm, such as an old orchard, as black eagles are loath to descend to below the cover of trees. Posting a shepherd armed with a bullwhip to guard the lambing ewes is also very effective, as the sound of one crack of the whip would be enough to drive any eagle off, should it even dare to descend in the presence of the shepherd. Removing any lamb carcasses lying around in the veld would help prevent the problem where none yet exists. A black eagle may develop a taste for mutton during hard times from feeding at lamb carcasses, thereafter conceivably taking an occasional unprotected newborn lamb when no more carrion is available.

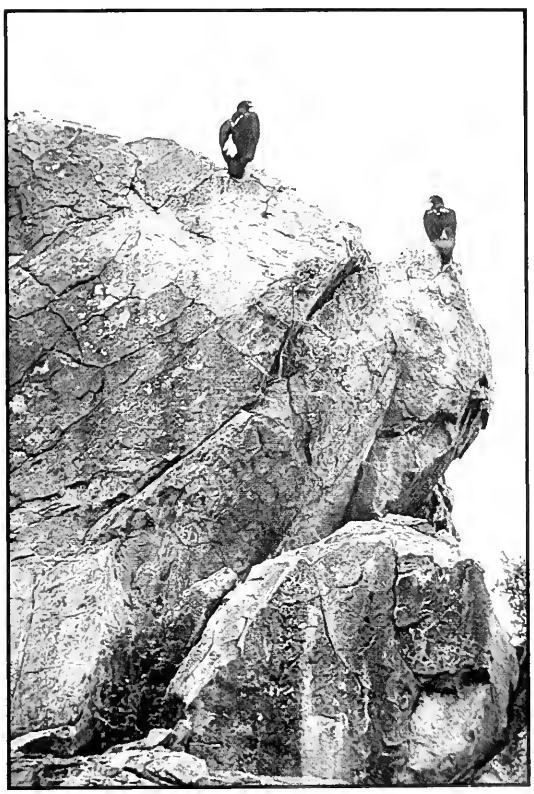
The lamb predation charge should also be considered in relation to the total feeding biology of the black eagle. In parts of the Karoo jackal, caracal and other predators have been practically eliminated and black eagles are also shot on sight. As a result, the dassie population has increased dramatically, and it has been estimated that the typical black eagle home range (64 km^2) supports a dassie biomass of between 67 500 and 282 500 kg. A fully grown black eagle, consuming on the average 350g per day, and wasting approximately 30% of an animal the size of a dassie, would require to kill approximately 170 kg of dassies per year to maintain itself. This figure multiplied by three results in 510 kg of dassies required per year to maintain a pair of black eagles and their offspring. This represents 0,75% of the *minimum* and 0,18% of the *maximum* dassie biomass available. In the midst of such plenty, it is inconceivable that the black eagle, being a dassie specialist, would have any impact on the lamb population.

It would also seem unlikely that the black eagle, taking less than one per cent of the dassie population per year, could exercise any meaningful control on the dassie population growth. The influence of harassment on the dassie population, however, is often overlooked. The presence of a pair of black eagles in the area acts as a powerful inhibitor to dassie range expansion, keeping the dassies confined to the cover of rocky koppies and effectively preventing colonisation of the plains in between. Under these circumstances other limiting factors to dassie population growth, such as competition for food and shelter, would become effective.

As experimental work has shown that dassies utilize among others the same plant species as sheep and that nine dassies eat as much as one sheep, the beneficial effects of a pair of black eagles on a sheep farm are obvious to any but the most prejudiced. The case for the defence rests, and the name "lammervanger" stands repudiated.

Apart from direct persecution by an uninformed or misinformed public, inadvertent or accidental disturbance or persecution takes its toll. Eagles die from feeding on poisoned carcasses put out for jackals. Disturbance of breeding birds by vandals, egg-collectors, hikers, rock-climbers, picknickers, hang-gliders, aircraft and unfortunately even some bird-watchers and photographers cause the birds to desert. Mining, agriculture, forestry, roads, dams and industrial and residential development make inroads into and degrade or destroy suitable habitat. Black eagles are amazingly adaptable, but there are limits to the adaptability of any species. As with all conservation issues, an ecologically well-informed and concerned public is a pre-requisite for a stable black eagle population. Every person who has read and pondered this article can play a vital role in spreading the conservation message, thereby helping to ensure the survival of this magnificent bird.

Typical black eagle country.



LORNA STANTON

Snares and Traps– The Scourge of Wildlife

Don Stott

Poaching is a problem well known to conservationists and landowners alike. The public image of a typical poacher as all too often that of a well-equipped hunter, shooting game at night with semi-automatic firearms and powerful spotlights from the back of a vehicle, or the organiser of the systematic shooting of rare and valuable species such as elephant, lion, leopard, cheetah and rhino to supply the traffic in ivory, skins and other curios. This image is without a doubt fostered by a number of court cases which have received a great deal of publicity in recent times.

While laying the blame for a considerable portion of the annual loss in wildlife squarely on the shoulders of the type of poacher just mentioned, the other side of the coin should also be considered. As it is relatively unobtrusive and seldom makes newspaper headlines these days, the extent of snaring and trapping in the Transvaal is seldom realised and appreciated by the public. For this reason it has been decided to publish a few facts concerning this problem in public interest, and more specifically in the interest of the farming community.

In large areas of the Northern Transvaal, poachers using wire snares and other devices pose a serious threat to indigenous wildlife, killing and maiming thousands of birds and mammals each year. Basically these poachers can be divided into two types. The first poaches for his own consumption and that of his family, while the second type operates for direct financial or other gain. This is the more serious offender as he usually poaches for meat on a large scale, or specialises in rare and localised species for the witchdoctor trade, or for the illegal trade in horn, skins, tusks, claws and other parts.

In the case of the witchdoctor trade, the rarer or more difficult obtainable the species in question, the more valuable it becomes as "muti" or medicine. The witchdoctor trade is a highly profitable and thriving trade, the extent of which increases annually. During recent raids in the Naboomspruit and Tolwe areas, 11 witchdoctors were arrested for illegally dealing in rare and protected species such as hedgehog, pangolin, aardvark, aardwolf, bushbabies, steenbok, klipspringer and various species of tortoise. In Pietersburg a man was recently convicted of selling certain items in a "muti" shop, including hedgehog, klipspringer and aardvark skin cut into small pieces at up to 50c per piece. A klipspringer skin thus cut up would sell for more than R1 000, while he would probably have paid the poacher no more than R2,00 for the entire skin.

The bill of a vulture sells for approximately R10,00. In a recent case two men were convicted of killing nine Cape vultures, using fish hooks baited with meat on thin wire strategically placed around a donkey carcass. Not only the bill, but the bones, feet and feathers are used by witchdoctors, and it would be safe to say that a witch-

LORNA STANTON

doctor would make more [illegible] vulture carcass he had originally for. The Cape vulture, by the species.

Poachers trading in illicit meat [illegible] vicinity of ready markets. More often [illegible] around farm or mine staff compounds number of labourers available and with meat. Such poachers are often well org[illegible] operate on a large scale, setting up to 100 s[illegible] time.

The poacher who poaches for his own consumption usually sets a limited number of large snares for antelope, or large numbers of small snares for guineafowl, francolin or hares.

Snaring is the most common poaching technique, and is probably the cruellest and most ruthless of all the methods of killing or capturing animals ever devised. Unfortunately it is also the easiest, simplest and cheapest method, making it a serious threat to wildlife indeed. There are many types of snares, ranging from the small horsehair or fishing-line snares for birds and line snares for gamebirds and hares, to larger wire snares for small and medium-sized antelope and cable snares for anything from impala to buffalo, hippopotamus and elephant. The raw material is readily available in the form of fencing wire and old cable, and the only tool normally required is a pair of pliers. The fact that a snare is so simple and cheap to make brings about further problems, as it is no loss to a poacher to abandon a snare line if he notices strange spoor or other signs of human presence near one of his snares. Once abandoned, the snares remain a potential danger for many years. Many cases of wild animals or stock caught in snares, prove upon investigation to be the victims of snares set and abandoned years ago.

A poacher setting snares on a farm will avoid a camp occupied by stock, for fear of catching a cow or ox and drawing attention to his activities. He will rather concentrate on a camp which is being rested, where only wild animals may be found. These will not so readily be missed by the landowner.

As many species keep to specific paths to and from their feeding grounds and watering points, a snare set in a game path has little chance of missing. A favourite poacher's method is to construct a crude boma of thorn bushes and branches around a water hole, leaving a number of openings in which snares are then set. The only way in is through one of the openings, and another animal is snared. At one particular water hole 17 head of game were snared in the course of nine days, using only 23 snares.

Another example of the efficiency of snares may be mentioned. A large number of line snares had been set for guineafowl and francolin on a particular farm. A freshly-caught guineafowl had just been released [illegible] On being released it flew away, landed some [illegible] away and started running. Within a short distance it was caught in another snare, it was released a second time, minus a few feathers, and one wonders if it was not caught a third time [illegible] quently found in this area of only [illegible] been set by children about [illegible]

Poaching with sn[illegible] difficulty to detect and to get a convictio[illegible] of this 527 accused were convicted in on[illegible] the Potgietersrus district alone, which gives an [illegible] indication of the extent of the problem. It is conse[illegible] estimated that only some 2% of snares are ever detected and removed. In one year 11 700 snares were removed in the North-western Transvaal, yielding by extrapolation an estimated 585 000 snares in the region. If half of these were set for small to medium-sized animals such as steenbok [illegible] and hares, represents a length of wire 40[illegible] km in length, [illegible]

ing the average snare consists of 1,5 m of wire. The snares set for larger animals such as kudu and wildebeest represent even more wire, with an average snare containing up to four strands of steel wire three or four metres long.

The loss of wildlife in a well-executed trapping operation is a cause of grave concern to the conservationist and farmer alike. In a particular raid on poachers in the Mokeetsi-Duiwelskloof area in 1979, no less than 57 accused were arrested and 1 006 snares were removed on two tomato farms. These snares were made from the wire used for tying up the tomato plants. A total of 31 dead animals were accounted for in a period of four days, in addition to at least 11 which had broken loose and had most probably died a slow and lingering death. The 31 animals killed by 1 006 snares represents a ratio of one animal per 32 snares set, and if the additional 11 animals which broke loose are included, a ratio of one per 23 snares is obtained. If the estimated total number of snares in the North-western Transvaal mentioned earlier is considered, a ratio of 1 animal caught per 23 snares yields by extrapolation a loss of 25 434 mammals and birds per year - a very sad state of affairs indeed.

Apart from snaring, the other techniques used by poachers are as varied as they are ingenious and warrant closer scrutiny.

Gin traps are quite widely used. They are the most difficult of all traps to detect when properly set, being buried under a thin layer of soil and leaves. In spite of this, 209 gin traps were seized in 1979. Gin traps have been used throughout the world for over a hundred years, mostly by fur trappers and vermin hunters. The design was originally intended for carnivores and other mammals with stout paws. Gin traps vary in size from small traps suitable for trapping squirrels and other small animals to the large bear trap, a terrible device with toothed jaws quite capable of holding a lion.

The gin trap is used by poachers for game animals such as steenbok, klipspringer, duiker and even kudu. It is normally set in a game path and domestic dogs, cats and stock may often be inadvertently caught. It is diabolically reliable, and once an animal places its foot in the trap and the jaws snap shut there is no escape, other than by the victim tearing or chewing its foot off. It is a cruel and painful method and has been banned by legislation, apart from use by a landowner in the immediate vicinity of the carcass of stock killed by a carnivore such as a lion or leopard. The same limitation also applies to the use of snares.

Trap cages are often used, commonly for birds such as guineafowl and francolin, but for small mammals such as cane rats as well. They are not as serious a threat to wildlife as gin traps or snares. Other less common methods, such as hunting with dogs and the use of whip traps and bird lime for birds, account for additional thousands of animals.

Poaching in any form is a serious threat, but much can be done by the public and especially the landowner to combat it. Any snares or traps that are encountered or even heard about should be reported to the nearest Nature Conservation Officer without delay. The snare or trap should not be disturbed, as the *modus operandi* of a poacher can often be his downfall - most poachers use a distinctive method or knot to form the snare or set the trap. If a Nature Conservation Officer cannot be contacted, the trap or snare should be removed, destroyed or made inoperative.

Education of all sections of the population is vital, and schools, compounds and farms are regularly visited by officers of the Division who give lectures and arrange film shows. A clampdown on the receivers or buyers of poached meat and animal products is in full swing, as the poacher cannot make a living without the demand created by a stable and ready market.

The suffering that this oribi must have gone through can hardly be described in words.

P C VILJOEN

Flora Conservation in Transvaal

S P Fourie

The conservation of flora is intimately bound up with man's attitude towards nature, which in turn almost amounts to a way of life. In the words of the famous conservationist Aldo Leopold: "We abuse land because we regard it as a commodity belonging to us."

When applied to indigenous plants, this attitude is normally expressed as a desire to possess them. Although nobody will deny anyone the right to see flowers in the wild state, nobody can claim the right to remove them from nature.

A factor which, strangely enough, favoured flora conservation in the past was a relative lack of public interest in our indigenous plants. Lately, however, this picture has changed dramatically and a lively and growing interest in our flora has developed. This has unfortunately also resulted in a direct threat to certain plant groups such as the euphorbias, cycads, asclepiads and orchids. We must accept the fact that, as the side effects of the activities of man increase, increasing stress will be placed on the environment. The processes, once begun, will continue — natural ecosystems will continue to be eroded and as this happens more and more plant species will be in urgent need of protection.

This situation calls for an effective and realistic approach to flora conservation. The concept of conservation encompasses more than total protection, and can best be interpreted as the wise management of this natural resource. This is a vitally important and responsible task, and consequently the management and conservation of flora is the responsibility of the respective nature conservation authorities of the different provinces.

The Transvaal Nature Conservation Division is fully alive to these responsibilities, endeavouring to fulfil its function by a variety of means. One of the first steps in conserving indigenous flora is the promulgation of efficient legislation. During 1967 the Nature Conservation Ordinance (Ordinance 17 of 1967) was passed by the Provincial Council. Prior to this there were four separate ordinances dealing with the province's fauna and flora.

The object of the Ordinance's chapter dealing with indigenous plants is to afford all indigenous plants (with special reference to those species scheduled as Protected or Specially Protected Plants) some measure of legal protection, to exercise control over dealers in indigenous plants and to make certain concessions to landowners regarding the utilization of plants on their property.

The Nature Conservation Ordinance will be of little use if it does not provide for the effective enforcement of legislation. Although law enforcement is at times one of the more unpopular duties, its importance must be fully realised. Nature Conservation Officers are active throughout the province and their success in law

Helichrysum sp.

LORNA STANTON

enforcement can clearly be seen from the number of cases coming to court. Law enforcement is not the only role with which these officers are entrusted. They play a very important and active part in educating the public in all matters concerning the conservation of the province's fauna and flora.

In accordance with the Provincial Council's statutory function to provide for the conservation of the fauna and flora of the Transvaal, various nature reserves have already been proclaimed and more are planned for the future. At present the Division of Nature Conservation is responsible for the administration of 38 nature reserves where both fauna and flora are protected. Six of these are flora reserves, proclaimed for the sole purpose of protecting one or more rare plant species.

Four of the flora reserves are situated in the picturesque Barberton area. The beautiful aloe *Aloe vryheidensis* is protected in the Cythna Letty Flora Reserve, which was proclaimed on 15 February 1967. Two other rare aloe species, *A. albida* and *A. chortolirioides*, enjoy protection on the Tinie Louw Flora Reserve. The Thorncroft Flora Reserve, which was named after the late Mr G Thorncroft who discovered *Aloe thorncroftii* in 1914, comprises an area of 16 hectare and gives protection to this aloe. The fourth flora reserve in this area - the Ida Doyer Flora Reserve - was proclaimed on 29 January 1964 on an area of 32 hectare. This reserve was established for the exclusive purpose of conserving the rare cycads *Encephalartos paucidentatus* and *E. heenani*. The Vertroosting Flora Reserve, which is situated near the town of Sabie in the Eastern Transvaal, was established for the protection of a unique stand of the red-hot poker *Kniphofia splendida*. *Encephalartos eugene-maraisii* is a cycad which enjoys quite a wide distribution. An isolated population of this interesting species is found near the town of Mica in the Letaba district, and consequently this area has been proclaimed as the Lillie Flora Reserve.

The enforcement of legislation and proclamation of flora reserves are by far not the only activities undertaken by the Division in flora conservation. The Provincial Nursery at Hartbeeshoek near Pretoria plays a very important and necessary role in the whole conservation programme. Indigenous trees and shrubs are propagated here and distributed to various provincial grounds and schools. The object of this is to promote an awareness and interest in the province's wealth of indigenous flora among all sections of the community.

A very successful project is the cultivation of cycads. More than 85 000 seedlings, representing 25 species, have been cultivated to date. The object of cycad cultivation is firstly to increase the numbers of these threatened plants and secondly to make surplus cycads available to the public, thereby discouraging the removal of wild cycads by collectors.

The Provincial Nursery is unique in South Africa and enjoys widespread recognition and interest. Many visitors from all over the world, including botanists, researchers and students from universities, schools and colleges, are received here. The staff are also involved with the training programme of Nature Conservation Officers, horticulturists and conservationists from neighbouring states and homelands. The control of encroaching exotic vegetation and implementation of veld burning programmes on the various flora reserves is a further responsibility of the nursery staff.

Every year, tremendous efforts are made to ensure the safety of rare plant populations from man's impact on the environment. Rescue operations are undertaken in various regions in the Transvaal where certain rare plants are threatened by road or dam construction, afforestation, mining and residential development or industrialisation. Hundreds of thousands of plants have in this way been successfully saved from threatened areas.

Estimates based on past surveys suggest that a probable five percent of the surface area of Transvaal, excluding the Kruger National Park, has to date been encroached by the green cancer of exotic vegetation. Although the complete control of exotic vegetation is an impossible task, the Division is responsible for the eradication of all exotic plant species in its nature reserves. Vast areas of land have up to date been cleared of species such as black wattle, gum and pine.

As previously said, the conservation of our flora encompasses more than total protection, but can best be expressed as the wise management of our flora. From the outset it was realised that wise management could only be accomplished with success if adequate provision was made for the necessary research on the numerous problems related to the flora of Transvaal. Several plant ecological and floristic surveys have been completed to date. Distribution surveys of protected plants and the effect of fire on the vegetation in several nature reserves are long term projects which receive continuous attention. An extensive survey, to determine the conservation status of the rare and endangered plant species of Transvaal, is gathering momentum and will be completed in the next few years.

Although the conservation of the Province's flora is the responsibility of the Director of Nature Conservation and his staff, there are numerous private bodies and government departments closely associated with this matter. The Division of Nature Conservation gives its co-operation to all these bodies in the daily effort to preserve our flora for future generations. In the broadest sense, conservation of flora goes beyond the efforts of the Transvaal Division of Nature Conservation, and that of various other departments, bodies and institutions to protect and manage our indigenous flora. It implies a common approach towards our flora by all sections of the community. The words of Aldo Leopold warrant long and deep reflection: "When we see land as a community to which we belong, then we may begin to use it with love and respect."

A quotation from a paper read by H B Rycroft at a Symposium on Nature Conservation in Cape Town in 1955 puts the situation in a nutshell: "We are proud of our flora. It is a heritage of nature and it is our duty as guardians of nature's gifts to protect and cherish it for all time."

LORNA STANTON

1

2

3

4

1. *Brunswigia natalensis.*
2. *Eulophia ovalis.*
3. *Pachycarpus scaber.*
4. *Protea rubripilosa.*

Reorganisation of the Nature Conservation Division

R Parris

Since its inception in 1947, the Transvaal Nature Conservation Division has steadily grown as the scope of its responsibilities expanded. As any organisation grows, it is necessary to make periodic adjustments to its internal structure to enable it to function effectively. The most recent reorganisation was implemented in 1980 and this article aims at highlighting the major changes when compared to the previous organisational structure, implemented in 1968.

As shown in Figure 1, the Division consisted of two main Sections (excluding the Administrative Section) in 1968. The Management Section was responsible for Bird Management, District Services, Fisheries Management, Flora Management, Game Capture, Nature Reserve and Game Management (Northern and Southern Regions) and Problem Animal Control. The Research and Information Section, on the other hand, was responsible for research on birds, fish, flora, game and problem animals, and the provision of an information service.

District Services, as subsection responsible for promoting nature conservation on private land, was administered from Head Office in Pretoria, as were the subsections Bird Management, Fisheries Management, Flora Management and Problem Animal Control. The Nature Reserve and Game Management subsection was partially decentralized into a Northern and Southern Region, with the supervisory office still based in Pretoria.

The Research subsection of the Research and Management Section was initially involved in carrying out research on birds, fish, flora, game and problem animals but in the early 1970's its responsibilities expanded to include the fields of outdoor recreation, ecological planning and herpetology. The Information subsection was relatively small and was mainly responsible for producing the Division's publications.

In the 1980 reorganisation the previous two Sections were replaced by three new Sections, namely Regional Services, Specialist Services and Planning, as shown in Figure 2.

Regional Services is reponsible for the two major functions of District Services and Nature Reserve Services. These functions have now been integrated and fully decentralised into three Regions, namely the Eastern, Northern and Western Regions, with regional headquarters at Nelspruit, Pietersburg and Pretoria respectively. Two Professional Officers have been included in the staff of each Region and these Regional Ecologists provide a valuable advisory service, particularly to landowners. Each Region now functions as a mini-department, with the advantages of shorter lines of communication and improved co-ordination on a local level.

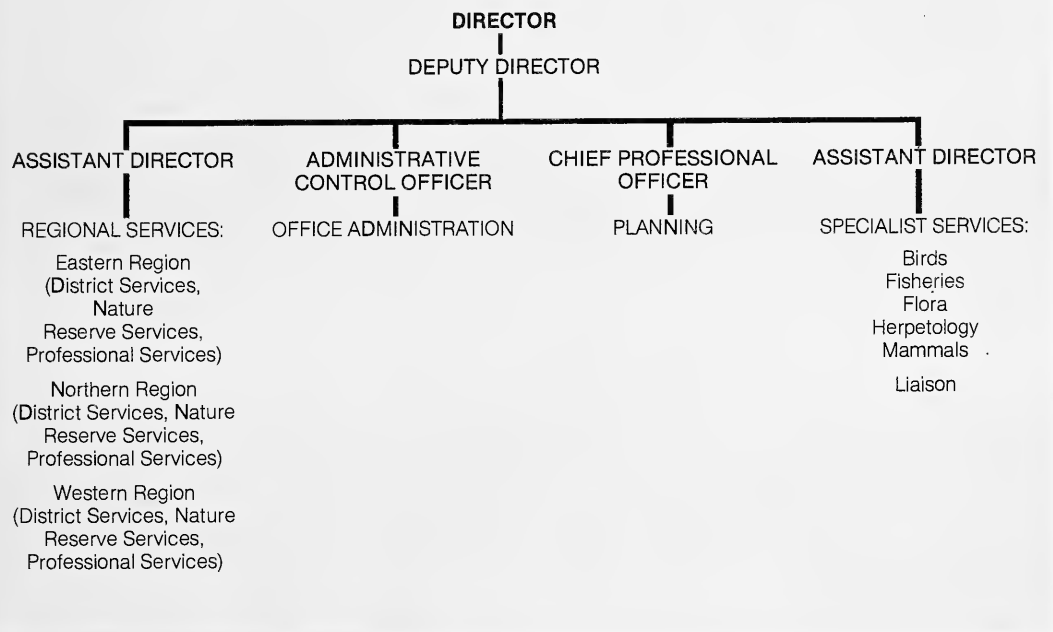
Specialist Services is responsible for advice and assistance requiring specialist knowledge and operates on a province-wide basis. The subsections which were previously responsible for similar specialist functions, such as Fisheries Management and Fisheries Research, but which then fell under different Sections, have now been combined as one subsection under the Specialist Services Section. This change ensures the most efficient use of the limited specialised manpower in the Division. The new combined subsections are Birds, Fisheries, Flora, Herpetology and Mammals. Information has now been absorbed into the new Liaison subsection, which consists of a Publications Unit, a Technical Unit which includes a photographer, taxidermist and artist, and a Public Relations Unit with two Public Relations Officers. The establishment of the Public Relations Unit is an important development, as a good public image is as important to a conservation organisation as it is to a private business concern, and good public relations can only be achieved and maintained by having an active public relations programme conducted by qualified staff.

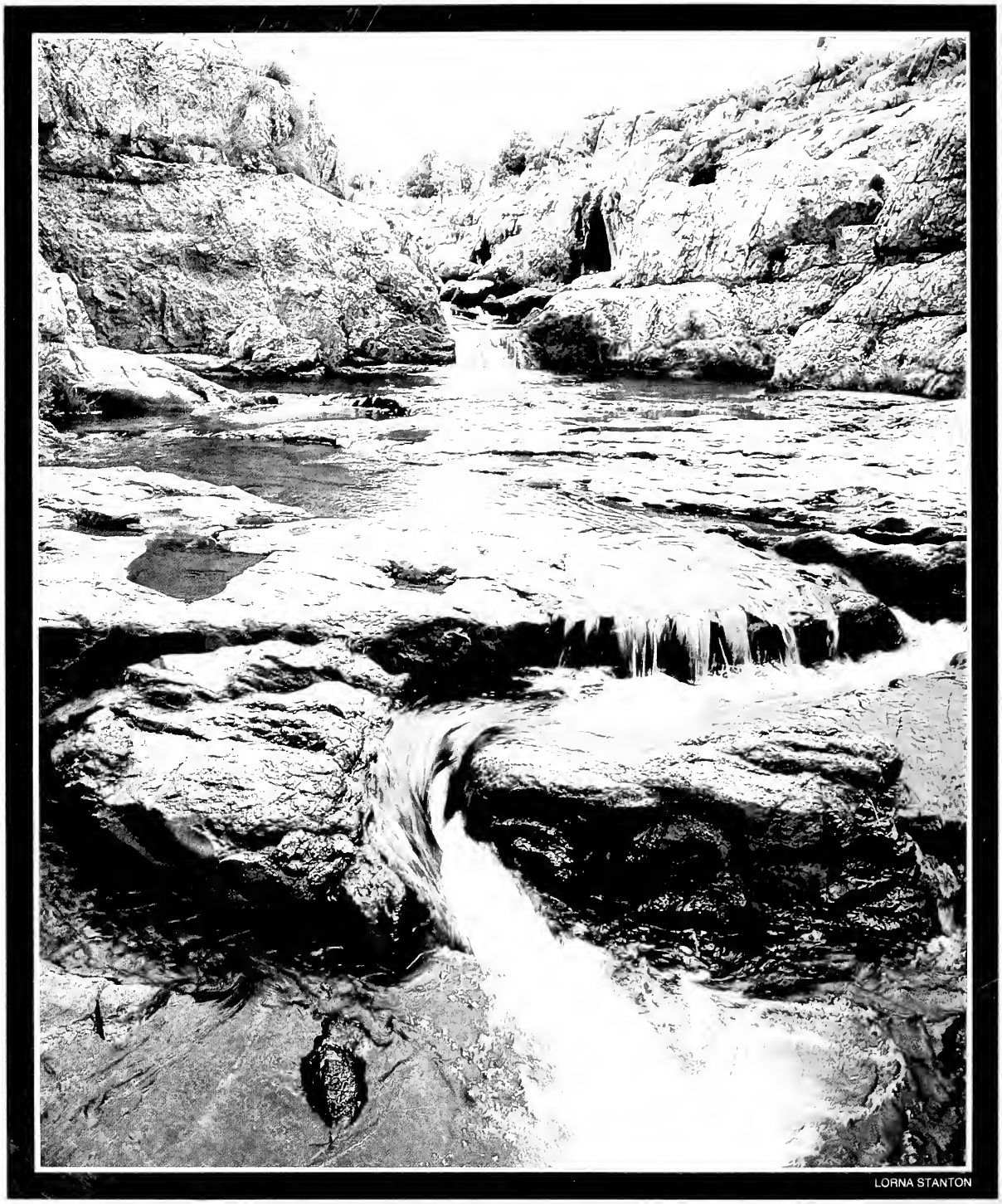
Finally, the introduction of a full-time Planning Section, to process and synthesise all available information and prepare detailed management plans for the Division, is a great stride forward in ensuring that the Divison's wide range of activities are properly co-ordinated and executed.

The development of the new structure was a joint effort by the Transvaal Provincial Administration and the Commission for Administration. The benefits are already being felt in the day to day running of the Nature Conservation Division.

Figure 1 SIMPLIFIED ORGANISATION CHART: NATURE CONSERVATION DIVISION 1968

Figure 2 SIMPLIFIED ORGANISATION CHART: NATURE CONSERVATION DIVISION 1980





LORNA STANTON

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CONTENTS

Zoological Gardens and Nature Conservation 1

Bullfrog Behaviour 5

And it is supposed to be easy to capture a Buffalo 8

Rare Proteas of Transvaal 13

Conservation and Utilisation of Waterfowl in the Transvaal 16

Frithia pulchra 19

The White Waters Reborn 21

Trophy Hunting in the Transvaal 26

Conservation of Tiger Fish and Fish Farming Techniques 30

The Euphorbias Re-evaluated 32

Front cover: A mopane moth *Gonimbrasia belina* on an autumn blanket of mopane leaves. The catepillars appear in vast numbers during certain years and form an important part in the traditional diet of many African peoples. They contain a high percentage of protein and when dried, fried or grilled have a flavour resembling a blend of lucerne meal and biltong. Photographed in the Hans Merensky Provincial Nature Reserve by Peter Barichievy.

Back cover: Small-spotted genet *Genetta genetta,* photographed at night on Mr Hans Hoheisen's bushveld farm Kempiana by Dick Reucassel FRPS.

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Looking Back – And Into the The Future

The findings of the staff will be published from time to time in an attractive manner in the publication "Fauna and Flora".

With these words the then Administrator of the Transvaal, the Hon Dr Wm Nicol, described the purpose of *Fauna & Flora* in the foreword of the first issue, which saw the light in 1951.

Now, with the publication of the fortieth issue 32 years hence, a brief pause to reflect on what has been achieved is indicated.

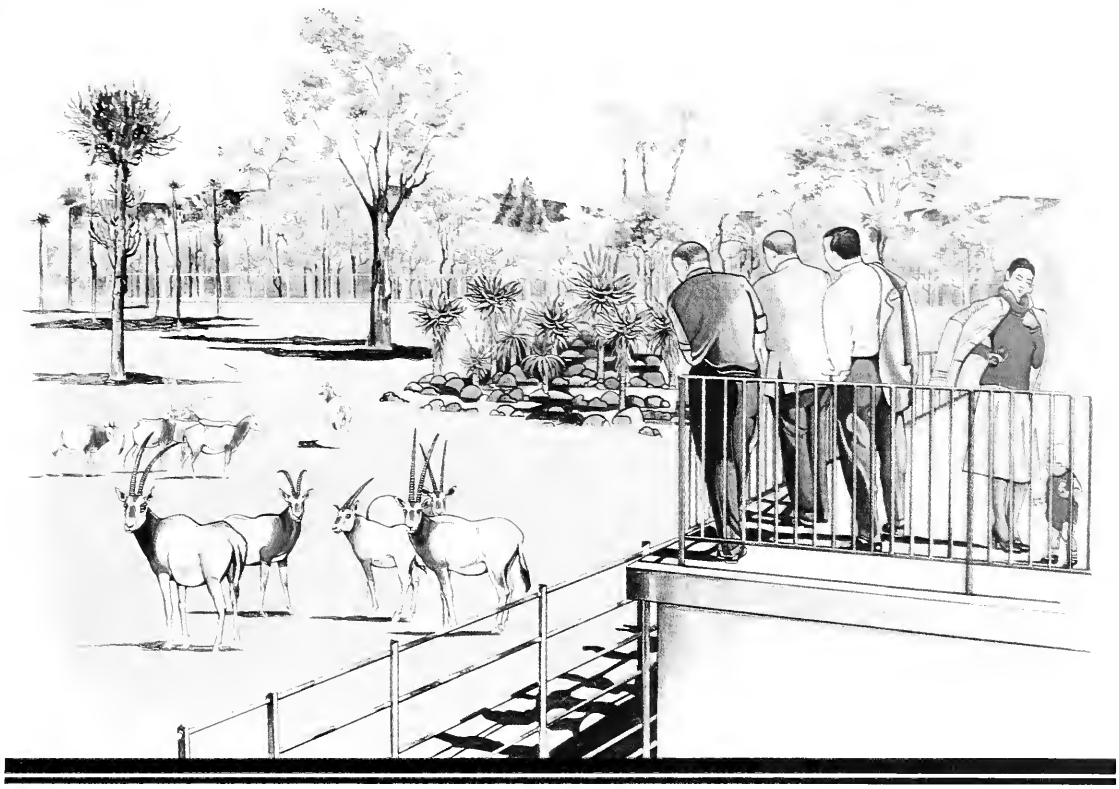
In 32 years 40 issues, representing 2 610 pages and 279 articles in both official languages, have appeared. Included here are six special issues, each covering a specific topic ranging from the jackal as problem animal (Issue 4) and Loskop Dam Nature Reserve (Issue 11) to Wildlife research in the Transvaal (Issue 37). These were illustrated by 1 136 photographs, 93 tables, 42 diagrams and graphs, 12 fold-out maps and 248 figures. Of the 40 issues, 11 were bilingual while 29 were produced as separate English and Afrikaans editions.

The early issues were mostly produced as the result of friendly and informal co-operation between any staff members who could squeeze the time in between their normal duties, although at times assistance from outside was co-opted. Issue 13 was the first to be produced on a more formal basis by a full-time editor. Dr R Bigalke stayed on until 1968 and the publication of Issue 19. He was succeeded by Roger Grafton who was responsible for the "new look" of Issue 20 – a larger format, lavishly illustrated full-colour publication now aimed primarily at the conservation education of the general public. Since then a succession of 12 editors, backed up by a staff of photographers, artists, typographic designers, production assistants and proofreaders have steadily developed, refined and improved the concept to embody what *Fauna & Flora* is today – a conservation publication enjoying international circulation and acclaim.

From the first issue, *Fauna & Flora* has been an essential link in the Division's conservation education programme. For this reason the production costs are provided for in the Division's annual budget. It can thus be made available free of charge to any interested person. As the present circulation figure is around 60 000, the impact of *Fauna & Flora* on the conservation awareness of the public can hardly be overestimated.

Change for the sake of change alone is seldom warranted, but if it meets the demands of changing times it becomes highly desirable. Up to and including the previous edition, *Fauna & Flora* has always lacked a certain indefinable "something" – possibly an image of identity, a certain stamp of individual character. In planning *Fauna & Flora* 40, a hard look was taken at this shortcoming and it was consequently decided to re-think the whole concept. Hence the completely fresh look, which will be carried on in future issues. We hope that you, the reader, will consider it an improvement too.

CJN



Zoological Gardens and Nature Conservation

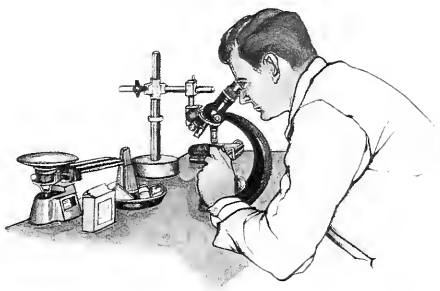
Laurie Smith

Man's effort to conserve what is left of nature consists of two paralell and integrated approaches. The first is an effort to save endangered plant and animal species from extinction. The second is a programme to conserve suitable representative ecosystems, each with its own diverse and interrelated population of organisms, in as inviolate a state as possible.

Throughout the world zoological gardens, in co-operation with other organisations, make a highly significant contribution to the first approach. In this they are stongly supported by the International Union for the Conservation of Nature (IUCN). It may by claimed that if sufficient representative species from an extinct ecosystem can be maintained in zoological and botanical gardens, it should be possible to restore that ecosystem at a later date, even if it had been completely destroyed, to enable it eventually to function as before.

The modern zoological garden fulfils two important functions, apart from the recreational function. These functions entail firstly the launching of educational programmes to make the public aware of the complex interactions and interrelationships in nature and secondly the establishment and maintenance of breeding and research programmes with rare and endangered animals.

In the National Zoological Gardens in Pretoria a large number of animal species which are classified in the Red Data Book as being endangered are maintained and exhibited in captivity. This includes the following: the giant eland, a very rare antelope which occurs on the southern fringes of the Sahara desert; the scimitar-horned oryx; the addax antelope; the pygmy hippopotamus and many smaller mammal species such as the lemurs and other primates.



Although the space available at the zoo grounds in Pretoria has always been a limiting factor, important breakthroughs in the breeding of a number of valuable species have been made through the years. In the case of the

anthropoid apes, the orang-utan has been bred on two occasions, while chimpanzees and the very rare gibbons are bred regularly. The lemurs from Madagascar are considered to be endangered as a group, but ring-tailed lemurs, brown lemurs and white-fronted lemurs have been bred regularly for years.

Recently both the brown hyena and the spotted hyena were bred, an achievement seldom reached in a zoo. The rhinos deserve special mention. The first white rhino calf ever to be born in captivity arrived in 1969, in the 70th year of the National Zoological Gardens. Since then a further nine calves have been born.

The breeding of birds is receiving increasing attention. On conservation grounds it is undesirable to trap birds in the veld for exhibition purposes.

In the case of birds of prey, the first important breakthrough occurred when a pair of gymmogenes hatched an egg and subsequently this pair has reared two chicks. After this, the zoo succeeded in breeding rock kestrels. After a few necessary structural changes where made on the bird of prey cage, a pair of Cape vultures hatched an egg. Although the chick had to be reared by hand, a great deal of information on the behaviour and breeding biology of these birds in captivity is now available and further breeding successes are expected in future.

Although blue cranes can be successfully kept in captivity, they breed with difficulty under these limiting conditions. An average of three pairs breed and rear chicks at the National Zoological Gardens each year. During 1981 a pair of crowned cranes bred for the first time, and reared three chicks. Waterfowl including Cape teal, redbilled teal and many exotic species breed each year.

A few years ago the National Zoological Gardens, in cooperation with the Transvaal Nature Conservation Division, obtained a number of young bald ibis. In the spring of 1982, two pairs built nests and laid eggs. This represents a break-through in the breeding of this endangered species in captivity.

For many visitors the flamingos are an enchanting sight. Few people realise however that an important breakthrough was made a few years ago when efforts to get them to breed succeeded. Even under natural conditions flamingos seldom breed in South Africa, as they are highly specialised birds requiring specific environmental conditions to trigger breeding. By the creation and maintenance of an artificial environment in which all the necessary biological factors are present, it has for a number of years been possible to breed up to fourteen chicks per year.

To undertake and maintain a really efficient breeding programme, a viable breeding population of animals has to be kept in captivity. This inevitably implies larger numbers. Since the National Zoological Garden is situated in the centre of Pretoria, possibilities for expansion are limited and other alternatives for suitable land where larger groups of animals could be housed had to be found.

The National Zoological Gardens' breeding centre and reserve at Lichtenburg was established in the 1970's and today 38 species of rare exotic and Southern African antelope occur on this reserve. These animals have bred so well that the first surplus stock will be made available for relocation or exchange in the foreseeable future. Apart from this, an area of approximately 20 ha has been converted into a wetland with dams of varying depth.

These changes in the habitat have been to the benefit of the bird life and large numbers of waterfowl have established themselves.

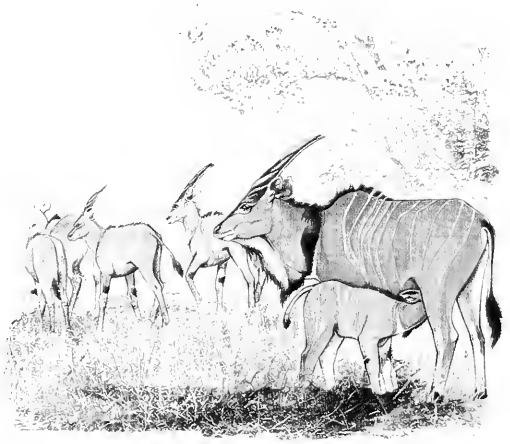
A similar reserve, approximately 1 000 ha in extent, was opened at Potgietersrust recently. This reserve, situated in a warmer climate, is used as a breeding centre for animals from tropical areas and 33 species of antelope have already been established.

For many years now the modern zoological garden is no longer solely a centre for public amusement and recreation, as it increasingly fulfils an educational, research and conservation function.

At the Cheetah Research and Breeding Centre at De Wildt, which has achieved international recognition, important data on the breeding, diseases and problems associated with the breeding of cheetah in captivity are obtained. More than 200 cubs have already been born at this centre.

The importance of goal-orientated breeding programmes is accentuated by the world-wide international co-operation between zoological gardens. Exchange transactions regularly take place to obtain new species for exhibition and for educational, research and breeding purposes. In the case of endangered and rare species, records are kept in which all the breeding stock of the zoos participating in this international programme are registered. To maintain genetic diversity and to prevent inbreeding, individual members are advised by experts before breeding with a particular pair is undertaken. Pedigree records already exist in the case of black rhino, white rhino, tiger, tapirs, giant eland, and many other species. Exchange transactions between zoological gardens also result in specimens of an endangered species being housed in zoos throughout the world. It ensures that these species are less susceptible to natural disasters, disease, political change and civil unrest, and also presents an opportunity for more people to view these animals.

The other major function, namely that of extension work, has become so important during the past decade that an educational division was recently established at the National Zoological Gardens in Pretoria. At present approximately 150 000 school children and students visit the zoo each year for lectures, film shows and other forms of education. The educational programme can be divided into three components. The first is the provision of specific information on animals by means of name boards and information exhibits at cages, as well as general exhibits on nature conservation and related topics. The second component is the answering of written and telephonic enquiries and the production of radio talks and television programmes. The third and probably the most important component entails the presentation of lectures on an organised basis. The syllabuses of the various Education Departments are used as a guide-line and all scholars from standard three upwards additionally complete questionnaires during their visits. This service is presented to all race groups by the professional staff of the educational division. Students from tertiary institutions receive lectures on fundamental ecological principles, while lectures on specialised subjects are presented to more advanced or special interest groups.



In 1981 special courses held after hours and during school holidays were instituted. These courses are scientifically planned to convey advanced biological knowledge to the participants. In these courses conservation principles which apply to modern man are given special attention. At the end of a course an examination is completed after which a certificate is issued to each participant, certifying participation in or successful completion of the course.

When all these functions are considered it is clear that the modern zoological garden does not only offer recreational opportunities, but has developed into a centre for the conservation of wildlife as well as a highly efficient educational institution.

Scientific names of animals in the order mentioned :

Giant eland	– *Taurotragus derbianus*
Scimitar-horned oryx	– *Oryx dammah*
Addax antelope	– *Addax nasomaculatus*
Pygmy hippopotamus	– *Choeropsis liberiensis*
Orangutan	– *Pongo pygmaeus*
Gibbon	– *Hylobates lar*
Ring-tailed lemur	– *Lemur catta*
Brown lemur	– *Lemur macaco fulvus*
White-fronted lemur	– *Lemur macaco albifrons*
Brown hyena	– *Hyaena brunnea*
Spotted hyena	– *Crocuta crocuta*
White rhino	– *Ceratotherium simum*
Gymnogene	– *Polyboroides typus*
Rock kestrel	– *Falco tinnunculus*
Cape vulture	– *Gyps coprotheres*
Blue crane	– *Anthropoides paradisea*
Crowned crane	– *Balearica regulorum*
Cape teal	– *Anas capensis*
Redbilled teal	– *Anas erythrorhyncha*
Bald ibis	– *Geronticus calvus*
Flamingos	– *Phoenicopterus ruber ruber*
	– *Phoenicopterus r. roseus*
	– *Phoenicopterus r. chiliensis*
Black rhino	– *Diceros bicornis*
Tiger	– *Panthera tigris*
Tapirs	– *Tapirus* spp.
Cheetah	– *Acinonyx jubatus*

ARTWORK: NATIONAL ZOOLOGICAL GARDENS, PRETORIA

VINCENT CARRUTHERS

Bullfrog Behaviour

Vincent Carruthers

Considerable public ignorance and misconception exists about the bullfrog, probably due to its size, formidable appearance and supposed aggressive behaviour. These are, however, all adaptations moulded by millions of years of evolution to ensure its survival.

The guttural calling of toads, so typical of a Transvaal summer evening, is often mistakenly attributed to "bullfrogs". In fact, the voice of the true bullfrog *Pyxicephalus adspersus* is not a common sound at all and can usually only be heard on a few days in the year at suitable breeding sites during ideal weather conditions.

The bullfrog is South Africa's largest amphibian, with many individuals exceeding 200 mm from snout to vent.. It is a burrowing species, and spends ten or more months of the year underground. With the first summer rains they emerge – often suddenly and in considerable numbers – to forage and breed. During this time some remarkable behaviour can be observed, much of which was first recorded by Prof B I Balinsky and Dr J B Balinsky during the fifties and sixties.

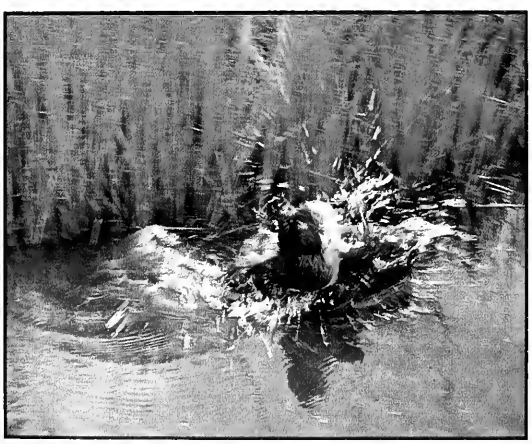
The breeding sites are shallow grassy depressions or seasonal pans which fill with rain water after a heavy downpour. The choice of such shallow water may seem peculiar for such a large frog, but the ability to exploit these temporary pans has allowed the species to extend its distribution over the dry savanna, in areas where little other surface water is to be found. These pans are also free of many aquatic predators which abound in more permanent water, and would therefore be safer for eggs and tadpoles.

ALISTAIR THOMPSON

The peculiar mating behaviour of bullfrogs. The eggs are fertilised while the mating pair hold their hindquarters up out of the water.

Whatever other advantages a shallow breeding site may have, it has enabled the bullfrog to develop an unusual mode of egg fertilisation. Standing on the bottom of the pond, the mating pair raise their hindquarters above the water, where the female produces a small mass of eggs. These are immediately fertilised by the male and then washed away as the frogs lower themselves again. Much of the seminal loss which presumably occurs in normal underwater mating is thus prevented and the incidence of fertilisation is much improved.

Another peculiarity of the breeding behaviour is the fighting which takes place between males at the breeding site after the eggs have been laid. Unlike the males of other species, male bullfrogs are somewhat larger than females. Attacking with their formidable jaws, these giant amphibians toss one another bodily into the air amidst loud grunts and splashes. Superficial injuries are quite often inflicted and the purpose of these encounters is difficult to understand.



ALISTAIR THOMPSON

Combat between two males at the breeding site.

Male aggression during the breeding season is frequently turned upon an intruder and even humans may be chased and snapped at. Although alarming, these attacks cannot result in anything more serious than a hard nip, but bullfrogs have acquired an undeserved reputation for being dangerous.

The males remain in the water for some weeks after breeding. During this time the tadpoles swarm in tightly packed groups close to the adult. With the ever present threat of their habitat drying up they have to develop rapidly, metamorphosing in about two-thirds of the time taken by most other summer breeders. On the Transvaal Highveld, the warmth of the shallow water greatly assists in this quick development. A tolerance for temperatures two or three degrees warmer than the lethal levels for other Highveld species enables the bullfrog tadpoles to utilise the hottest, sun-baked edges of the pan. To cope with the reduced oxygen levels of the warm water, the tadpole regularly exposes the gills on the underside of its body to the surface, and in every colony a number of individuals can always be found swimming upside-down near the surface of the water. This behaviour readily distinguishes the species from other tadpoles, especially those of the red toad *Bufo carens* which also congregate in swarms.

VINCENT CARRUTHERS

A male bullfrog guarding a swarm of tadpoles. It is still very debatable whether or not this represents genuine parental behaviour.

A plausible explanation of the formation of tadpole masses is that some predators might be put off by what would appear to them to be a single large animal. However, considerable debate still surrounds the fact that the swarms are so frequently found in the proximity of an adult male. One opinion is that the males are protecting their young. Their aggressive behaviour certainly seems to support this view, although the discovery of tadpoles in the stomachs of some specimens suggests a rather less lofty motive! Another possibility is that the tadpoles attract predators such as the platanna *Xenopus laevis* which itself then becomes food for the adult.

VINCENT CARRUTHERS

The lower jaw has two bony projections which grip the prey and are also formidable weapons.

Certainly the bullfrog's diet is very diverse and includes rodents, ducklings and snakes as well as other frogs. The prey is gripped by two tooth-like projections in the lower jaw and suffocated before being swallowed with the aid of copious secretions of oral mucous.

Four to six weeks after their emergence in early summer, the bullfrogs disappear underground again. It times of serious drought when even the subterranean moisture dries out, they survive by developing a cocoon of keratinous material. This seals up the entire animal except for the nostrils and loss of water is very effectively reduced.

VINCENT CARRUTHERS

A common toad *Bufo gutturalis* being devoured. The prey is first suffocated, then swallowed whole.

VINCENT CARRUTHERS

The keratinous cocoon is cast off, having protected the bullfrog against desiccation underground.

As with most species, bullfrogs are not threatened by the harshness of the environment, but by its degradation or destruction. Although some of their complex behaviour remains a mystery, much of it is clearly part of a remarkable adaptation to the capricious climate of the African veld. Provided that their habitat is not obliterated by agriculture and urbanisation, bullfrogs will remain one of our most fascinating wildlife species. ♥

Against the background of modern techniques, equipment and drugs it is easy to forget that even a few decades ago, the capturing of wild animals was a vastly different proposition. The early pioneers were all too often faced with seemingly insurmountable problems, rigours and setbacks and any degree of success was solely due to resourcefulness, dogged determination, raw courage and a sense of humour when things really went awry.

The following account of an expedition to Mozambique some thirty years ago is based on field notes kept by the author at the time. It clearly shows how much the state of the art has progressed since then and pays tribute to everyone involved in the game capturing operations, past and present.

EDITOR

And it is supposed to be easy to capture a Buffalo...

W K Kettlitz

In the fifties a project was launched to cross-breed cattle and buffalo, in an attempt to obtain progeny with a degree of immunity against stock disease. For this purpose a few wild buffalo had to be obtained, which had to be tamed down so that they could be safely handled.

After lengthy negotiations with the then Portuguese authorities in Mozambique we eventually obtained permission to capture buffalo in the area between the Limpopo and Save Rivers. A team of five whites and five blacks was selected for this difficult task and we began preparing for the expedition.

If you want to catch a bird, it is said, you only have to sprinkle some salt on its tail and then it becomes easy. Unfortunately it isn't quite as simple in the case of buffalo. In those days no anaesthetics, apparatus or proven game-capturing techniques were as yet available and the only method was by hand. The animals either had to be driven by horse or vehicle, or ambushed, or caught in snares or pits, or simply followed in the vague hope of an opportunity arising. Whatever the approach used, it was

always very hard and discouraging work with little chance of success.

On 26 October 1954 our expedition left Letaba in a truck, a Landrover and a bakkie loaded with personnel, camping equipment and supplies for a month. From Louis Trichardt we travelled through Punda Milia and the Kruger National Park to the village of Pafuri in Mozambique.

Our supplies included a bag of coarse salt, £11 (R22) in silver coins, a few packets of 0,22 cartridges, a new £5 (R10) note and a pair of ladies' silk stockings as *baksheesh*. Salt was very scarce and a highly valued commodity in that area.

Pafuri was a small settlement which included the border-post, the WNLA office (the organisation responsible for recruiting mine labour) and the office of the *chefe de posto* (administrator) of the Pafuri area.

Here we had to have our passports inspected and stamped and the documents and permission for our five blacks seen to. This little matter, which naturally included the transfer of gifts, took up a day of highly complicated negotiations.

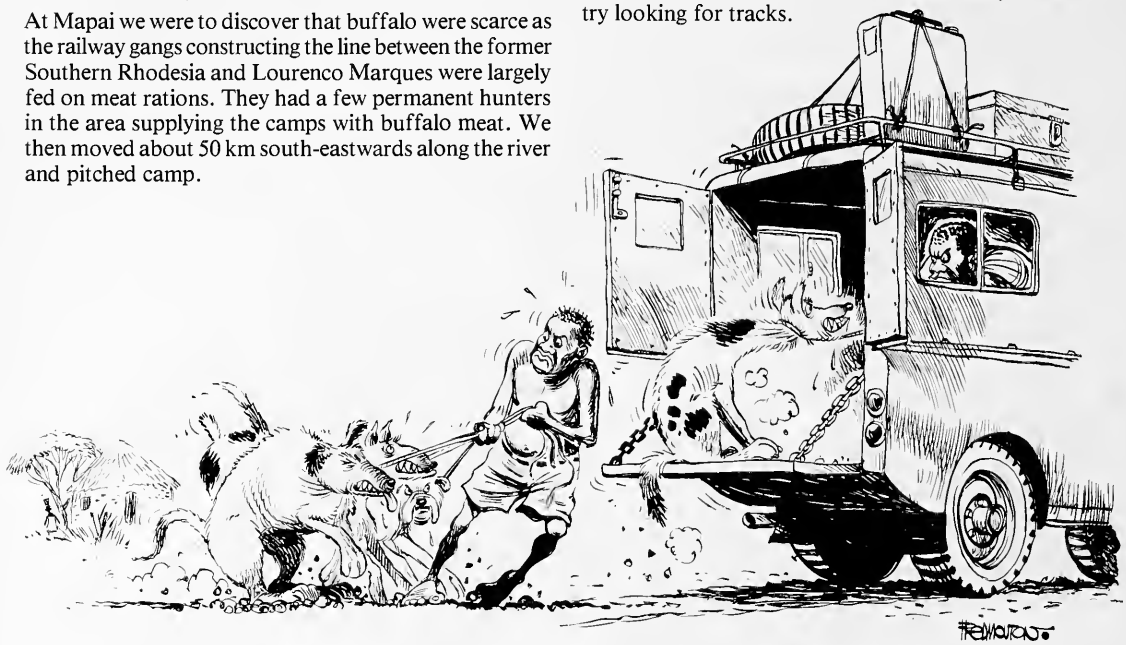
From Pafuri we travelled all along the Limpopo River for approximately 100 kilometres to Mapai. Mapai was also a WNLA post. In addition to a trader named Paes who owned the shop and eating-house, there was also the *fiscal* (game warden) named Dias.

We had permission to capture buffalo calves, but this had to take place at all times accompanied by a guide appointed by the *fiscal*. He was a black Portuguese named Papseco. He would also supply us with hunting dogs necessary for the execution of our task. Papseco was a type of chief with considerable influence in the area.

Our plan was to locate a herd of buffalo with the aid of the dogs and then to try to separate some of the calves from the herd and capture them by hand. To prevent the dogs savaging the calves, they had to be muzzled by means of leather muzzles brought along specifically for the purpose.

Despite our prior agreement with him, it soon transpired that Papseco was unable to supply any dogs. We were then obliged to hire an additional guide. One with dogs, and of course a piccanin to handle the dogs. The piccanin in turn was to be controlled by the black guide Judus who was to be controlled by the black guide Papseco who was to be controlled by the *fiscal* Dias.

At Mapai we were to discover that buffalo were scarce as the railway gangs constructing the line between the former Southern Rhodesia and Lourenco Marques were largely fed on meat rations. They had a few permanent hunters in the area supplying the camps with buffalo meat. We then moved about 50 km south-eastwards along the river and pitched camp.



On the morning of 28 October we attempted to muzzle the dogs. They were timid creatures which fled off into the bush at the sight of a white man. Only by whistling and much coaxing was the piccanin able to get them all together. The piccanin then had to catch each dog and hold it to enable us to envelop it in a big, heavy khaki overcoat in such a way that only the mouth protruded. We would then put on the muzzle and fasten it round its neck. That was the idea anyway.

The first muzzled dog we released tried to scratch it off with its paws. Then it tried to stand on its head in an attempt to rub the muzzle off against the ground and jumped around like a dog demented.

In the meantime we released a second muzzled dog. It disappeared into the bush and we never saw it or the muzzle again.

The third dog carried on in such a way that we started to fear for its safety. We decided then and there to forget the idea and to catch the two dogs still dancing around on their heads and remove their muzzles. While catching one of the dogs and wrapping it in the overcoat, its shoulder was injured and had to be put down. By this time we had eight of the original ten dogs left and it was already too late to try looking for tracks.

The guide, piccanin and dogs arrived late at our camp on 29 October but soon afterwards the entire party moved down along the river where we fortunately chanced upon buffalo tracks, among which were those of calves.

As beginner's luck would have it the dogs quickly cut a young calf and a nearly fully-grown heifer from the herd and with much noise and commotion chased them into dense bush. They were not able, however, to separate the calf from the heifer. The heifer was very aggressive and we took to the trees. Meanwhile the calf had escaped and the heifer kept us in the trees, watching the situation closely and charging at anyone daring to move. This carried on until we were eventually compelled to shoot her.

At least we now had enough meat to keep the guides and piccanin with the dogs in our camp. Thus we were able to get going earlier on in the morning and avoid the worst heat

of the day. In order to locate a herd of buffalo we had to rise at 3 am as the sun was already up by 4.30 am. On finding fresh tracks we would follow them.

The dogs would only heed the picanin's whistling and shouted commands, and even then the degree of control was highly questionable. They were original pedigreed pariah dogs which could be trusted to chase everything that moved, especially hares. The result was that by the time we managed to find buffalo they were already rather worn out. Without exception they would run far ahead and we had to follow the noise as best we could. Sometimes the dogs cut off a lone bull from the herd, sometimes a cow with her half-grown calf but mostly they rushed crazily after the herd.

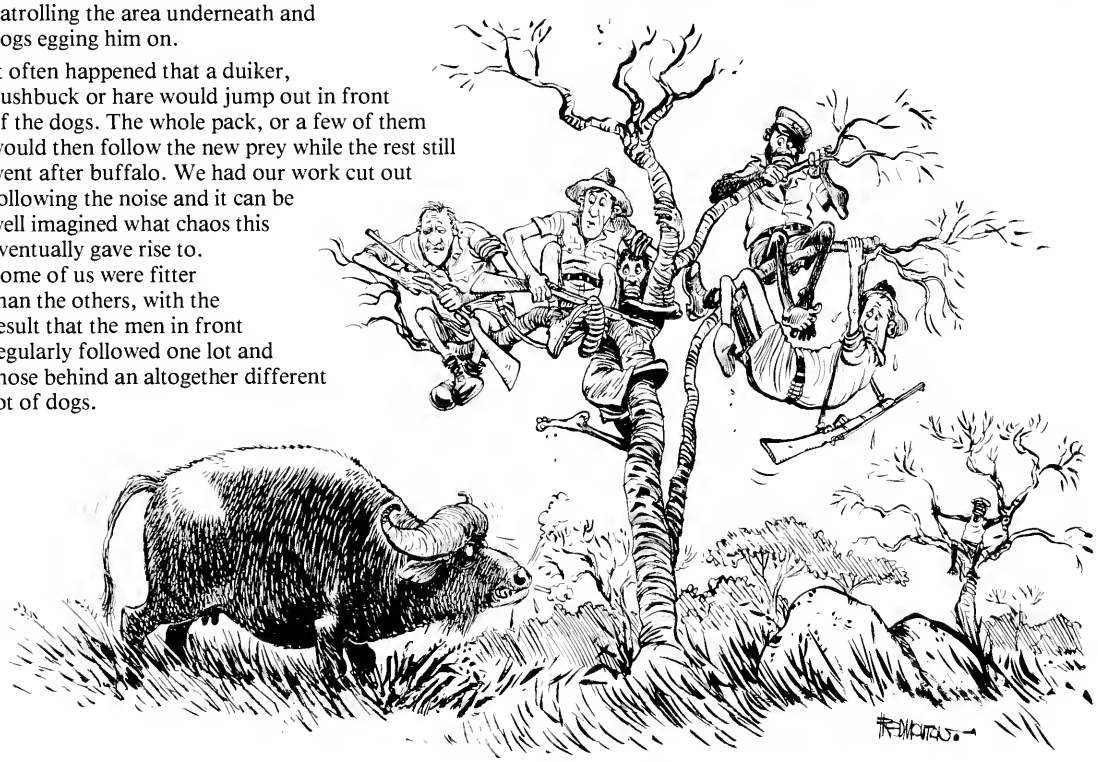
It is not particularly amusing to arrive panting after a headlong chase through the dense msimbite bush, expecting to find that the dogs had cornered a buffalo calf, and encounter an enraged buffalo bull instead.

The msimbite ironwood *Androstachys johnsonii* is an uncomfortable tree, to say the least, as the trunk starts branching quite far above the ground. It is however no problem with a buffalo on your heels. Then both white and black would take to the heights with an enraged buffalo patrolling the area underneath and dogs egging him on.

It often happened that a duiker, bushbuck or hare would jump out in front of the dogs. The whole pack, or a few of them would then follow the new prey while the rest still went after buffalo. We had our work cut out following the noise and it can be well imagined what chaos this eventually gave rise to. Some of us were fitter than the others, with the result that the men in front regularly followed one lot and those behind an altogether different lot of dogs.

an additional 5 shillings (50c) each for every buffalo caught. As Papseco was not able to supply dogs and we had been compelled to hire an additional guide in order to obtain more dogs and of course a piccanin to control them, costs rose considerably.

On Sunday 31 October we enjoyed a well earned rest. The men and the dogs were footsore and exhausted. Judus' dogs were unable to continue and we did not achieve much



By 9 am anything from 10 to 40 km would have been covered. The men and the dogs would be exhausted and not much hunting would take place after that.

In this crazy manner we managed to catch a heifer on 30 October. Her horns were about 12cm long. We haltered and blindfolded her and half led and half carried her to camp.

The agreement reached with the guides was that they would each receive £1 (R2) per week and the guides and piccanin on Monday and Tuesday while I searched everywhere for new dogs. On Wednesday 3 November I obtained an addditional pack of dogs and we were in high spirits for the following day. Now we were able to alternate the dogs to enable them to rest every second day.

Early on Thursday morning, before we could get started, a black police patrol arrived. They were attached to an anti-rabies unit and before we could collect our scattered wits they had shot our new dog pack. Fortunately we were able

to persuade them to hold their fire, provided I could produce a letter from the *chefe de posto* at Pafuri by that evening instructing them to spare the old pack of dogs.

The track through the bush to Pafuri was in a very poor condition, but I had no choice but to drive and fortunately found the *chefe* in his office. He gave me the letter as well as permission to recruit another pack of dogs in his area and to use it until after the operation, after which all the dogs had to be destroyed.

By another stroke of fortune I heard of a black man called English who lived near Chicuala-cuala and who also had dogs. On Saturday 6 November I accompanied Dias the *fiscal* to English's village. After heated argument and many threats by Dias, English agreed. He had only three dogs, however, so we had to speak to a certain Ben and Jeromia to persuade them to supply their dogs as well.

We battled until late Saturday evening to get the piccanin and the three packs of dogs together. I am certain that the dogs had never seen a white man before, nor the piccanin a motor vehicle.

At 5 am on Sunday we started loading the dogs, the piccanin and English into the Landrover. The windows could only be kept slightly open and the doors had to be opened carefully on loading the dogs, otherwise those already inside would escape again. After a long struggle and much cursing we managed to get all aboard and were on our way. Within a few minutes all the dogs were sick and the piccanin as well. The interior of the Landrover and even my hair and clothes were soon smeared with vomit. We had no option but to hold our noses and press on for 70 km in the stench and mess to our camp. Here the dogs and piccanin tumbled out and lay down in the shade of the trees by the river. I drove the Landrover to the water's edge where those of us as yet uncontaminated set about scrubbing the vehicle while I washed myself from top to toe in the Limpopo.

On Monday 8 November we tried a new tactic. We kept the dogs on leashes until we were near the herd. We then selected a cow with a calf and shot the cow, hoping that the calf would stay with the cow while giving the dogs a chance to separate it from the herd. The new pack of dogs was very wild and nervous and could not really be regarded as hunting dogs, as they had been used solely for herding cattle.

In spite of problems and setbacks we managed to catch a bull-calf with horns approximately 18 cm long on that day. He was very aggressive and difficult to control. It took three big men to hold him. Fortunately we succeeded in putting a halter on him and blindfolding him and hauled and shoved him to camp.

This little bull charged everything that moved and someone had to keep watch all night to keep him from injuring himself. It started raining lightly that day and this continued through the night.

On Tuesday 9 November we caught another young heifer and it again rained the whole day. By this time both dog packs were very tired and footsore. Judus' dogs were very willing but when after buffalo they were able to keep it up for only a few hundred metres and then came whining back to the piccanin.

Every day we had to buy milk for the calves at a nearby village. The bull calf behaved as if already weaned and would not touch milk. He only drank a little water at night and remained very aggressive.

To add to our problems the rainy season had now commenced in earnest and already the Limpopo River was flowing strongly. The reinforced drift at Mapai could still be negotiated but it would not be long before it was under water. We began building a cage of tree trunks on the back of the truck while some of the men went out to try and capture more buffalo. Water was now to be found everywhere in the veld and the buffalo had moved away from the river. We looked for tracks all day but could not find any.

The guides were now determined to return home at all costs to plough. The dogs were exhausted and the men as well.

We decided to strike camp but first we had to return our guides to their villages and destroy the dogs.

While taking the the guides back on 11 November the bakkie slipped in a river crossing and the front spring snapped. Fortunately we could buy a piece of steel from Paes and using his tools and bellows made and fitted a replacement.

On 12 November we packed, loaded the animals and left in the night. The roads were in such a state by this time that we only arrived at Louis Trichardt the following evening.

Expenditure on wages, milk, the new spring and other diverse items amounted to exactly £11 1s (R22.10). ♥

ARTWORK: FRED MOUTON

Rare Proteas of Transvaal

Eduan Fourie

EDUAN FOURIE

Protea laetans

Of the eleven species of protea which occur in the Transvaal five can be regarded as rare. This means that the distribution of the plants is either restricted to one specific geographical area or habitat, or that it may occur sparsely over a very large area. In the latter case the species is not endangered as such, but vulnerable due to the small numbers within localised habitats.

Protea curvata, the Barberton lowveld sugarbush, has since 1890 only been known from a single hill near Barberton. A recent field survey, however, has indicated that there are other hills in the vicinity on which the plant is also found. It is unusual to find a protea in a hot Lowveld area as the genus generally prefers much higher and cooler habitats. *Protea curvata* is one of the rarest protea species and can be regarded as being endangered. Although the plant itself is relatively resistant to fire, the regular burning of the habitat is directly responsible for the present status. The specific epithet *curvata* is derived from the long sickle-shaped leaves. The deep red to light pink flowers appear during June and July.

Two rare protea species occur in the scenic Blyderivierspoort Nature Reserve. The Blyde sugarbush *Protea laetans* is without doubt one of the most beautiful proteas in the Transvaal on account of its glowing carmine-coloured bracts covered in thousands of tiny velvety hairs. This protea occurs only on the Blyderivierspoort Nature Reserve. The largest population where thousand of specimens may be seen is to be found on the slope of a hill just above the FH Odendaal Public Resort. Mrs Lynette Davidson discovered this exceptional plant while engaged on a plant survey of the area in 1970. She named the new species *laetans* which means "joyful" or "happy"

The Transvaal mountain sugarbush *Protea rubropilosa* enjoys a much wider distribution than *Protea laetans.* The distribution range lies in the shape of a horseshoe all along the Drakensberg escarpment, from the Steenkampsberg near Lydenburg in the south to the Wolkberg in the north. The most striking examples can however be seen on the Blyderivierspoort Nature Reserve where several hundred trees form dense stands. The summit of one of the Three

LORNA STANTON

Rondavels is, for example, covered with these trees. The beautiful light to dark pink flowers appear from September to December with a peak around October.

Both *Protea rubropilosa* and *Protea laetans* occur in one habitat on a rock ledge below the Three Rondavels lookout point on the Blyderivierspoort Nature Reserve. It is exceptional to find two rare protea species in the same locality.

The strange stunted *Protea roupelliae* ssp. *hamiltonii* occurs in the vicinity of Nelshoogte near Barberton. This plant was discovered in 1957 by Dr P D Hamilton, after whom it was named. It is an extremely rare species which is distinguished from *Protea roupelliae* ssp. *roupelliae* by the peculiar stunted growth form. The plant is a low-growing shrub up to 300 mm high and 1m in diameter. This growth form may be attributed to the poor leached soil type on which it occurs. It is threatened by intensive forestry activities and may, if no conservation steps are taken, face eventual extinction.

The rather special Barberton mountain sugarbush *Protea comptonii* is found on the road between Barberton and Havelock. This plant which is covered with yellow-white flowers from May to August is one of the few protea species actually reaching tree height. Specimens of 8m and higher are not uncommon. The sight of a dense stand these trees, with their dark green leaves and hundreds of yellow-white flowers accentuated by a background of dun winter grassveld, presents a breathtaking scene. *Protea comptonii* was discovered in 1947 by Prof R H Compton. At present the species fortunately has a wide distribution which includes Natal, Swaziland and Transvaal, although the biggest populations are found in the Barberton area in the Transvaal.

Although these five *Protea* species, with the exception of *Protea roupelliae* ssp. *hamiltonii,* are not really being threatened there is nevertheless reason for concern about their future. The systematic destruction of natural habitat, whether by excessive veld fires or by forestry activities, may eventually result in the plants being assigned threatened status. ♥

S P FOURIE

Protea comptonii

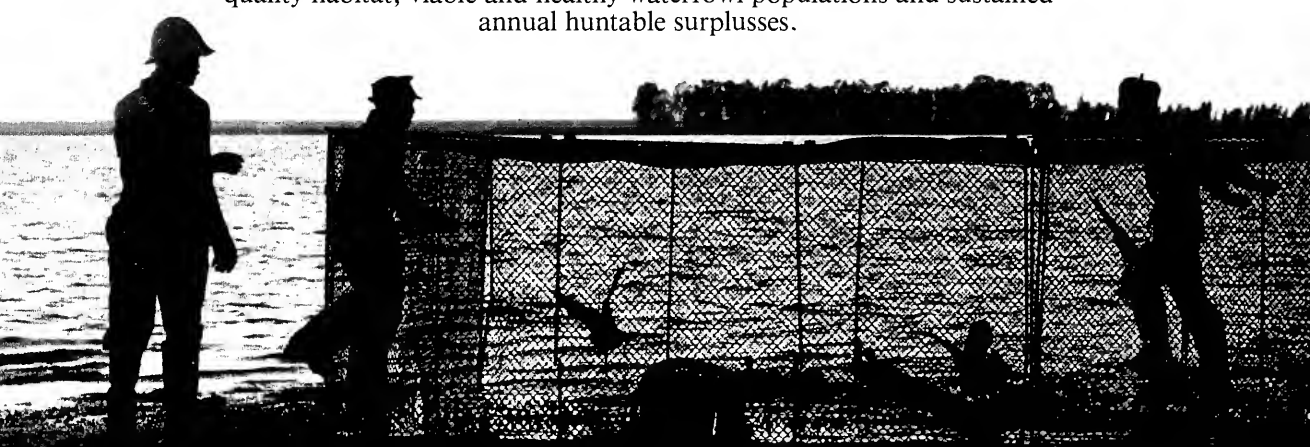
S P FOURIE

Protea rubropilosa *Protea curvata*

Conservation and Utilisation of Waterfowl in the Transvaal

David Skead

Co-operation and consultation between the landowner, the hunter and the conservation authorities is to be the ultimate benefit of all, ensuring quality habitat, viable and healthy waterfowl populations and sustained annual huntable surplusses.



WILLIAM MASSYN

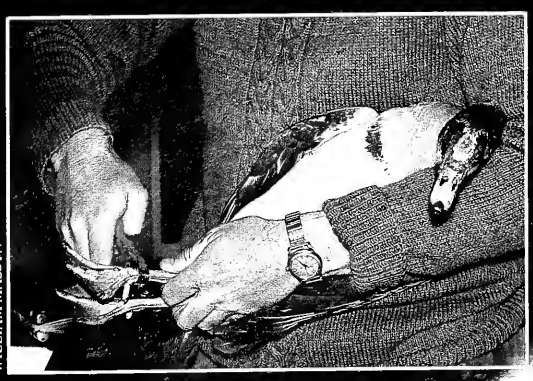
Waterfowl, in the sense used here, refer to the 16 species of African duck recorded in the Transvaal. They range in size from the large spurwinged goose *Plectropterus gambensis,* where some males exceed 7 kg, to the two smallest species, the pygmy goose *Nettapus auritus* and the hottentot teal *Anas hottentota,* which average less than 300 g. Incidentally, although we refer to several species as "geese", there are no true geese indigenous to the African continent. Our "goose" species are really ducks! These range from semi-aquatic species such as the spurwinged goose to the completely aquatic maccoa duck *Oxyura maccoa* and whitebacked duck *Thalassornis leuconotus.* Most of the ducks are semi-aquatic as they either nest on the ground away from water, spend a large part of the day resting on the shore, or feed on dry land.

Nesting habits vary between species. Some species, such as the yellowbilled duck *Anas undulata,* nest in open grassveld. The knob-billed duck *Sarkidiornis melanotos* nests in holes in dead trees, while the South African shelduck *Tadorna cana* nests in aardvark or porcupine burrows. Nesting habits can vary within a species. The Egyptian goose *Alopochen aegyptiacus,* for example, either nests on the ground, in old fish eagle or hamerkop nests, on cliffs, or even in such unlikely places as the tower of the cathedral in Grahamstown.

Most species breed in the rainy summer months and moult in winter, but the South African shelduck breeds in winter and moults in summer. All waterfowl species are flightless when moulting and require sheltered areas where they are undisturbed during this period. They therefore need habitat with permanent water such as large pans or dams, which are mainly favoured by the "geese", and reed-filled pans or vleis which are preferred by the smaller species.

It is therefore obvious that to effectively conserve our waterfowl the needs of each species at different times of the year have to be catered for. That in turn requires a detailed knowledge of the biology of each species. This requires staff and as manpower is limited, it was decided to concentrate on those species which are utilised for sport hunting. In the Transvaal four species of duck are classified as Ordinary Game, which means they may be hunted during the proclaimed open season, provided the prescribed gamebird hunting licence has been obtained. A landowner is exempt from requiring a licence to hunt

LORNA STANTON



WILLIAM MASSYN

on his own property. The four species are the spurwinged goose, Egyptian goose, yellowbilled duck and redbilled teal *Anas erythrorhyncha.*

The Transvaal Nature Conservation Division has for many years pursued a vigorous research programme on waterfowl at the Barberspan Ornithological Research Station, which is situated in the Western Transvaal between the towns of Sannieshof and Delareyville. For the past 25 years ringing has been an important facet of this research. The results have been reported in papers published in various scientific journals, or are currently being prepared for publication. These publications include reports on distance and direction travelled from Barberspan, body mass, mortality and survival estimates, age and sex ratios, moult seasons and the length of time each species is flightless. Field studies have mainly centred on the yellowbilled duck, because it is the commonest species, but the three other species have not been entirely neglected. These studies have included work on social and breeding behaviour, habitat requirements, food and feeding ecology, daily activity patterns, and weekly censuses of numbers at Barberspan.

The recovery or recapture localities of ducks originally ringed at Barberspan show some interesting and significant distribution patterns. Most of the yellowbilled ducks are recovered within 300 km of Barberspan and over 90% from the Highveld. Several have moved as far as the Cape Flats, but this is the exception rather than the rule. On the other hand, the redbilled teal is commonly recovered from Central Africa while two Southern pochards *Netta erythropthalma* have been recovered from Kenya. In fact, the mean distance that the latter species moves from Barberspan is in excess of 1 000 km.

Another important conclusion reached from the distribution data is that our ducks are generally nomadic rather than migratory. They are not confined by political boundaries either. Recoveries have been received from the four provinces of South Africa, South West Africa, Transkei, Ciskei, Venda, Bophutatswana, the Black homelands, and other countries including Angola, Botswana, Kenya, Lesotho, Malawi, Mozambique, Swaziland, Tanzania, Zambia and Zimbabwe. Waterfowl can thus be regarded as a shared natural resource and co-operation on an international basis will ultimately be required to ensure their wise conservation and utilisation.

In 1978 a Canadian parasitologist spent five weeks at Barberspan studying duck parasites. The spurwinged goose is currently being studied intensively by a student from the University of the Witwatersrand. The Transvaal Nature Conservation Division has started a co-operative project with the Orange Free State Nature Conservation Division to establish the numbers of different waterfowl species in the Highveld regions of the respective provinces. This is done by surveying the whole area during the annual dry season from a light aircraft at low altitude. The technique is widely used in North America and gives highly significant results in our case as well. Once the sizes of the different populations have been determined and monitored over a number of years, the parameters resulting from the ringing programme can be applied in the management programme.

A bird hunting licence costs R10,00 and this entitles the holder to hunt waterfowl, terrestrial gamebirds and the speckled pigeon *Columba guinea* during the annual open season. Licence holders are legally obliged to return their licences at the end of each hunting season. However, many disregard this condition of the licence. In fact, only 19% of the nearly 5 000 licence holders bothered to return their licences at the end of the 1980/81 hunting season. A Bird Utilisation Unit has been established in the Bird Subsection and one of the main tasks will be to analyse the annual hunting returns. It is in the interests of each hunter to supply his returns to help enable hunting to be managed on a scientific basis. After all, a lot of time has been spent gathering biological and ecological data on the birds.

An analysis of the 1980/81 hunting licence returns showed that 1 340 waterfowl were reported shot. This is a low total but it must be remembered that only 19% of the hunters returned their licences. Most of the duck hunters favoured yellowbill duck and almost half the birds shot were of this species. The average seasonal bag for Transvaal hunters was 4,5 birds, which is well below the average seasonal bag of 9,8 for duck hunters in Wisconsin, USA. However, our hunters get their birds in an average of 1,7 days afield as opposed to 11,5 days afield in Wisconsin.

P L E S MILSTEIN

The role of the private landowner is most important in the utilisation, welfare and ultimate survival of our waterfowl. Ploughing up to the edge of a pan, and sometimes right through a pan, effectively destroys nesting and feeding habitat. Overgrazing and burning contribute to loss of nesting habitat. Labourer compounds are often sited near a pan and the resulting increased human disturbance can render the pan unattractive to nesting birds. On the other hand positive conservation steps such as the fencing-off and protection of pans, vleis and dams; the prevention of water pollution; wise catchment area management; the education of labourers; the control of poaching and feral dogs; the judicious siting of labourer housing and routes of movement and the possible creation of new wetlands will individually and in combination increase the carrying capacity, with dramatic results on the waterfowl population.

Although waterfowl hunting is apparently not widely practised in the Transvaal, it is the duty of the Nature Conservation Division to conduct research into all aspects of this sport. Co-operation between the hunter, the landowner and the Division is vital, not only in the interests of the conservation of the birds, but also as a means of maintaining a contented, enlightened and responsible hunter community.

Fanie Venter

Frithia pulchra

LORNA STANTON

"Altogether it is of no importance – just a small creature that does a small job quickly and well."
Aldo Leopold (1887–1948)

Certain genera in the family Mesembryanthemaceae are collectively and popularly known as "window plants" on account of the major part of the plant being subterranean, while the apical parts of the succulent leaves are horizontal to the soil surface. This apical portion of the leaf can be compared to a window, as it allows penetration of light into the more deeply-situated photosynthetising tissue. These genera include *Lithops, Opthalmophyllum, Fenestraria* and *Frithia. Frithia* is a monotypic genus, resembling *Fenestraria* in external appearance and environmental requirements, but being rather more restricted in its geographical distribution.

The genus *Frithia* was named after Frank Frith (a gardener with the South African Railways in Pretoria). The specific epithet *pulchra* is derived from the Latin, meaning "beautiful". Various vernacular names include Olifantsvoet, Bobbejaanvingers, Toontjies, Glasies, Window Plant, and Fairy Elephant's Feet.

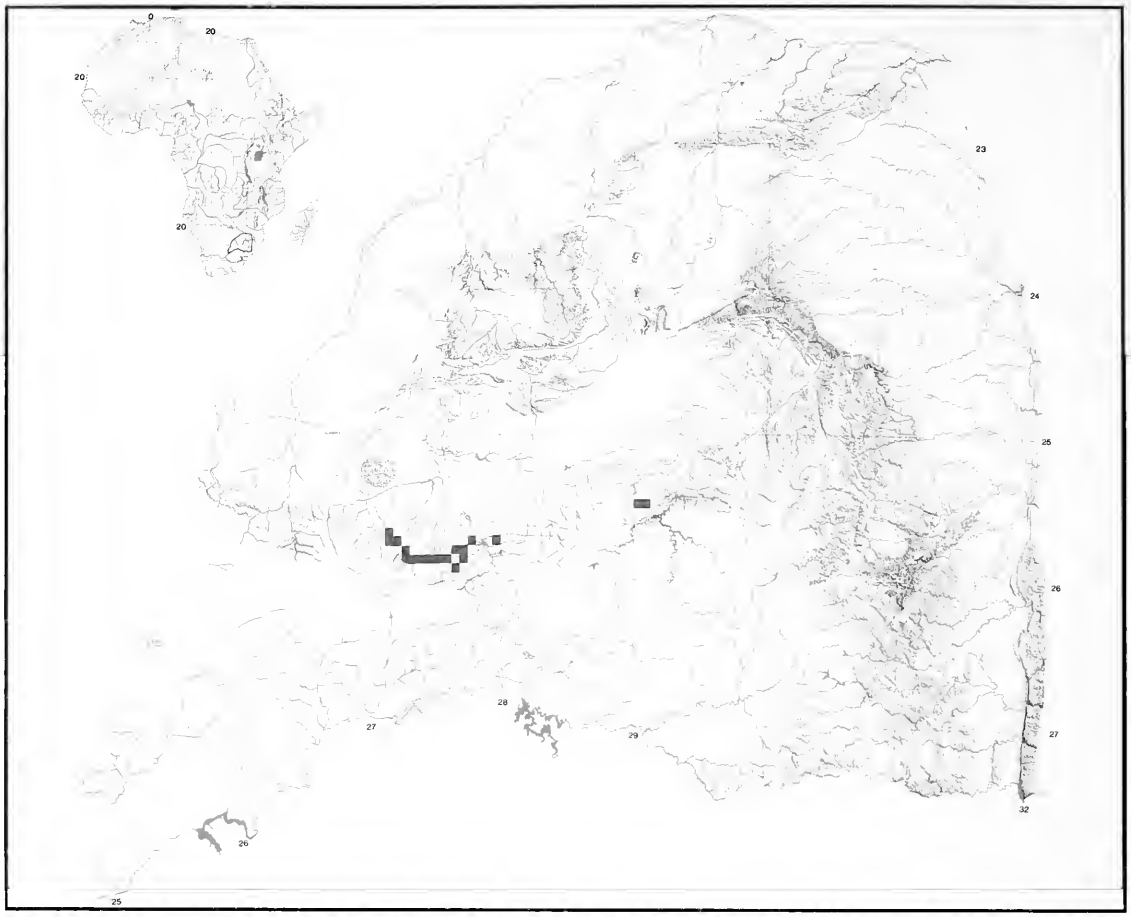
Frithia pulchra is a small, almost stemless succulent with a glossy surface. During the summer it may be exposed above the soil surface to a height of 10 to 25 mm, but during the dry winter months it shrivels and shrinks so that only 1 to 5 mm of the plant is exposed. Dry leaf remains usually occur below soil level.

The succulent leaves, 5 to 7 per plant, are arranged alternately and are very closely spaced. Towards the base the leaf is circular in cross section, becoming crescent-shaped distally with a round edge at the top. The leaves are mostly convex and curved on the outside, but occasionally they may be straight and erect. These leaves are 10 to 20 mm long, with the flat apical "window" 5 to 8 mm in diameter. The leaf surface is covered with densely-spaced convex papillae which are clearly visible to the naked eye.

An unique arrangement of the photosynthetic tissue exists within the leaf. A single layer of transparent epidermal cells which constitutes the "window", and which does not contain any chlorophyll, is situated on the outside. The papillae on the outer surface are thought to assist in reflecting light into the deeper parts of the leaf. Immediately inside this layer are two layers of palisade cells containing the photosynthetic pigments, and utilizing the light admitted by the transparent epidermis. Below these, and occupying the major part of the leaf volume, is the mesophyll which again is devoid of photosynthetic pigments, probably because very little light penetrates to that depth. This tissue is mainly responsible for water storage.

The flower is 20 to 25 mm in diameter and sometimes completely covers the plant when open. The numerous petals are usually deep violet in colour, becoming paler towards the pure white base. Near Witbank the petals are white with only the tips pink, and pure white forms are not unknown. The fruit is a five-locular capsule, 5 mm in diameter. Each capsule contains 150 to 250 small seeds.

A certain amount of variation is present in *Frithia pulchra,* probably caused by environmental influences. In some populations the leaves are very short, being only 4 to 5 mm long, and in shape more rounded than normal. The flowers are, however, as in the typical form. In some populations the epidermal papillae are so reduced in size as to be invisible to the naked eye, the external surface of the leaves thus appearing to be perfectly smooth. This feature remains constant under cultivation. The shape and size of the "window" varies considerably between populations and is probably not a stable variation, as it changes in



JOHN M ANDERSON

The distribution of *Frithia pulchra* is indicated by the red squares. Each represents a sixteenth-degree square unit.

character under cultivation. The colour of the flower varies from a violet red in the western part of the distribution range to nearly white in the east. Occasionally, however, populations with differing flower colour occur, surrounded by populations bearing flowers of another hue.

The flowers open during the months of November to February. The pollinating insects (mostly minute wasps and ants) crawl downwards into the flower-tube and while doing so rub their abdomens and backsides against the anthers which open towards the inside of the flower. In order to reach the nectar-secreting glands, these creatures have to clamber over the stigmas, and while doing so the pollen of this or another plant is rubbed off on the stigmas and pollination is effected. Within three weeks the capsule has reached maturity, and two weeks later it has dried out and is ready for seed dispersal. As the moisture of the atmosphere reaches a certain level, the valves of the capsule rupture and most of the seeds are catapulted out. A small percentage of seed remains to be dispersed during the next five years or so. It is claimed that the seeds are distributed mainly by water.

Frithia pulchra is rather local in its geographical distribution, occurring on the Magaliesberg range between the Pilanesberg in the west and Pretoria in the east, continuing as isolated populations as far east as Witbank (see map). It usually occurs on shallow, well-drained, rather coarse quartzite gravel over Magaliesberg quartzite, in direct sunlight at an altitude of 1 500 to 1 600 m. The average monthly maximum temperature between October and February in the distribution range is 34°C, and 24,8°C to 25,2°C between June and July. The average annual rainfall is in the region of 700 mm. The rainy season starts in October and ends in March.

The surrounding vegetation is usually seasonal grassland with scattered *Lopholaena coriifolia* shrubs and various other succulent plants, including *Aloe peglerae,* usually occur nearby.

It must be noted that *Frithia pulchra* is on the protected list and one is therefore not permitted to collect plants in the veld without being in possession of a permit issued by the Director of Nature Conservation.

Frithia pulchra is relatively easy to cultivate in fine gritty soil in a fairly shallow pot. Organic material must be worked into the gravel/sand mixture to establish a soil pH of 5,5 to 6. The plants require much direct sunlight with completely dry winters. After being transplanted, water should be withheld for two weeks, otherwise the plants are likely to rot. Seeds germinate easily if placed on top of the potting medium. Germination takes place in two weeks and growth is so rapid that the seedlings may be transplanted into separate containers within six weeks.

The face of the Witwatersrand has changed beyond all recognition since George Harrison's discovery of the first outcrop of gold-bearing reef near Langlaagte in March 1886. Among the worst affected were the "white waters" – those silver streams gurgling among the ferns after which the Witwatersrand was named. Now, for the first time in almost a century, this trend is being reversed with the dawning realisation that in terms of human needs and values conservation of the urban environment is every bit as important as the provision of roads, housing, education and employment.

The White Waters Reborn

Wendy Bodman

This is written by someone who is neither a professional ecologist nor an "eco-nut" but an ordinary person – a nurse, housewife and mother with an interest in the future. The writer lived as a child in the mountains among rivers and rocks. Above were clear skies, around were grasses, veld flowers and indigenous trees. Certainly, more than any other influence, that childhood memory of wandering alone through river valleys laid the foundation of a hope that future generations of children, living in cities, might have some experience of the feelings of awe and wonder which are stimulated by encounters with nature.

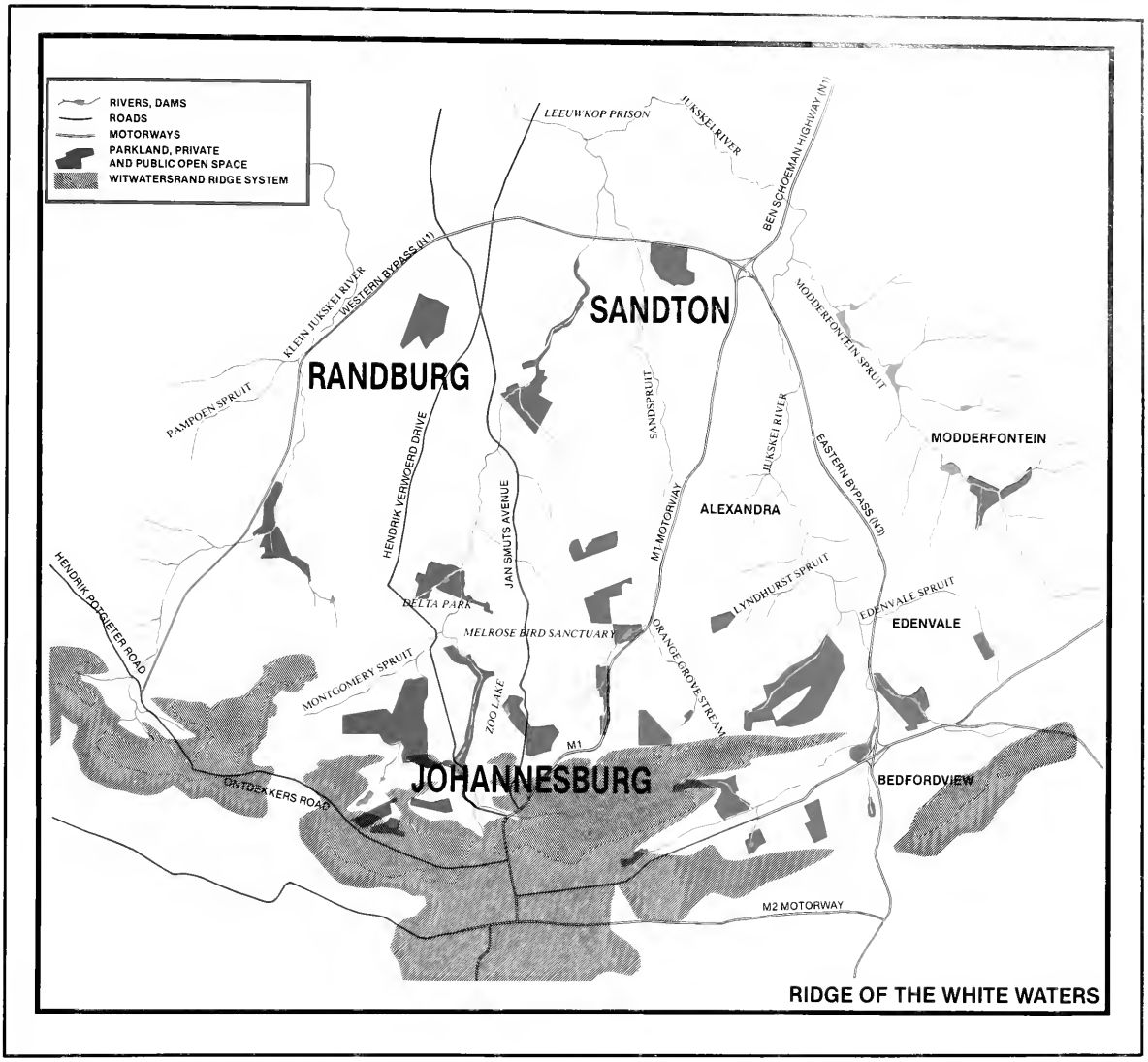
That yesterday world has changed. The firewood crisis has denuded valleys, soil erosion has silted up streams. In the words of Kingsley Fairbridge, from *A Reminder and Ingwi:*

> "The veld has vanished with the closing door...
> The veld which shall be Ingwi's never more."

Perhaps more than anything else, we realise today that the greatest threat to nature is the growing number of people inhabiting this planet. Our feet tramp the earth heedlessly, our hands damage and destroy ruthlessly (often ruthless because of ignorance). We spread our litter over the grass. We need living space and our homes are built over the whole earth. The more technologically sophisticated societies generate toxic industrial wastes which poison water, air, and soil. In cities damage is often irreversible as streams are buried in concrete and their functions are taken over by complicated new reticulations of drainage systems. Man surrounds himself with hectares of impermeable surfaces, which increase the danger of flooding and cause problems for people living downstream near flood lines.

In this milieu – complicated by the ecological unawareness of a major sector of society – my work began eight years ago as liaison officer for the Transvaal branch of a voluntary national conservation and anti-pollution organisation. Amongst the many other tasks of this job I was drawn to the trickling river valleys of the urban Witwatersrand. Inspired by The Star's *CARE* campaign, aided by 1:50 000 maps from the Surveyor General's office, the little streams of the Witwatersrand began to come alive to me. Like the mother of a sometimes unattractive handicapped child, I came to love the rivers for their potential beauty. Sometimes they were partly or completely buried. Sometimes marred by the by-products of man's throw-away society, especially drink containers and building rubble. Sometimes degraded by industrial wastes. Sometimes "tarted-up" into sophisticated city parks by well-meaning horticulturists and landscape planners.

Inflation took its toll, however. The cost of concrete increased and the availability of cement decreased. Canalisation as a means of putting the streams out of sight and out of mind became too expensive. Now, hopefully, the winds of change blowing across the world of conservation were blowing here too. The effects of urbanisation on the ecology of the Witwatersrand were being researched. A new generation of town planners and engineers was growing up – hopefully more sensitively attuned to the human needs of the future – and certainly more knowledgeable in the ways of water and streams.



TERRY MURRAY

Simplistically we were, still are, and always will be, faced with two alternatives:

1 Reduction of the land to total organisation by man.

2 Co-operation with nature.

The reaction to the first alternative is to ask whether man is wise enough to do this. Is he wiser than his Creator? Also, what about inflation? And what about the long-term ecological effect on rivers, estuaries, beaches, and the sea? Naturally, I believed in co-operation.

What was a vague gut-feeling seven years ago has become a searing conviction. We must conserve and nurture our urban rivers and river valleys, in perpetuity. We must conserve and nurture our urban ridges and mountains, in perpetuity.

And if continuity is lost? I am reminded of a question asked, some years ago, at an environmental slide show. "Can you quote one place in the world where a buried stream has been unburied?" The answer was no. The reason was expense. One day when the study of the future is more of a science it may be computed that the financial liability of a neurotic urban population, separated from nature, is even greater. In the meantime let us remember, with sadness, the places where rivers are buried and where the edge of peace between ridge line and sky is shattered by buildings and stop any further encroachment.

To the many specialists in our modern society, let us add another. An urban engineer with a deep knowledge of ecology and hydrology. He is badly needed.

The names of the streams of the Witwatersrand are very simple, but people still confuse them. Down the southern slopes are the south-flowing rivers, down the northern slopes are the north-flowing rivers. Of the latter the following are the rivers draining the Central Witwatersrand:

The Jukskei River flows from Ellis Park to its junction with the Crocodile. It collects water from every fold in the hills, linking the municipalities of Johannesburg, Bedfordview, Germiston, Edenvale, the areas of Modderfontein, Alexandra Township and those peaceful lands north-west of the Diepsloot Nature Reserve beyond Sandton. This river has unrecognised potential. It has long strips of vegetation along the banks where future children can roam, but as urban development spreads urgent conservation attention is needed.

WENDY BODMAN

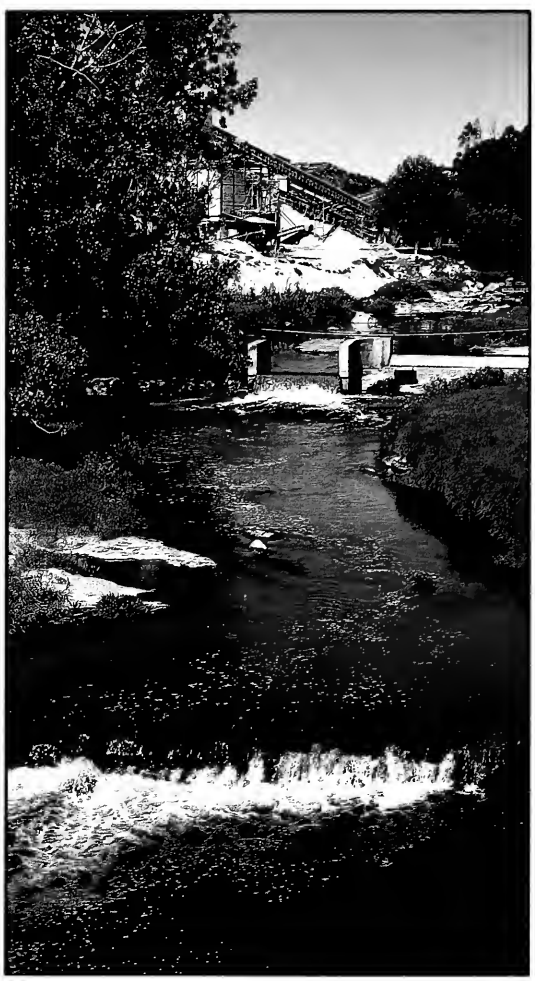
Then there are the true city rivers. The Sandspruit has four main tributaries draining Johannesburg. The most easterly arm is the Orange Grove Stream, the gushing origin of which can still be seen from the notorious death-bend in Louis Botha Avenue. Below Melrose Bird Sanctuary near the border of Sandton the Sandspruit receives its name and flows through this town to link up with the next city river, the Braamfontein Spruit, near the Leeuwkop Prison.

The Braamfontein Spruit is affectionately known as the "Braamies". To most people this is *the* river of Johannesburg. I disagree, because I know that all rivers are important.

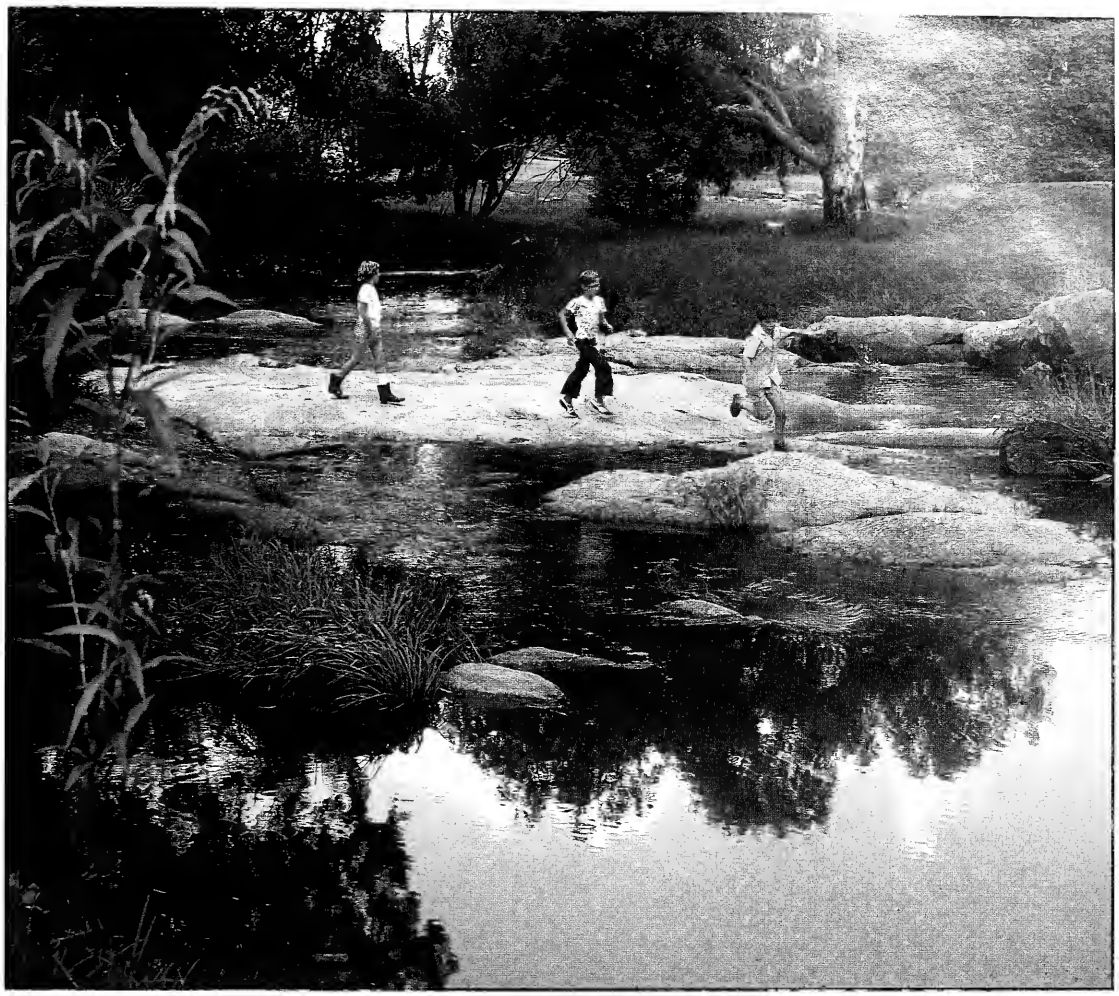
On October 17th 1981, with quite unprecedented publicity, the river trails (including walking, jogging and riding ways) were opened by the three mayors of Johannesburg, Randburg and Sandton, on a gala day. The 25 km parkland strip in which these trails are situated is said to be one of the longest urban parkland strips in the world.

Credit is due to *COCCOS* – the Co-Ordinating Committee on Community Open Space. For more than five years this committee of dedicated officials from the three contiguous municipalities have surveyed and developed the relevant sections of the river. They have proved that close co-operation is possible between neighbouring local authorities. They have proved that nature can survive man's urbanisation. They may have helped provide a pattern for human survival.

An example has been set for the rest of South Africa to follow. Naturally the work of *COCCOS* is still unfinished. In the Witwatersrand it must be expanded to include the Jukskei and the Sandspruit and, on the western edge of the Central Witwatersrand, the Klein Jukskei (the fourth north-flowing river of the Central Witwatersrand). There are also the rivers of the Western Witwatersrand and, of course, the south-flowing rivers.



WENDY BODMAN

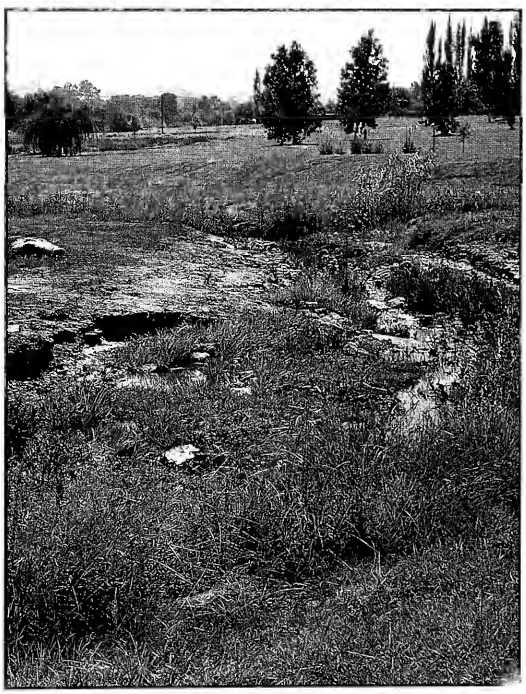


WENDY BODMAN

Should heads shake and tongues mutter "cost", it may be repudiated on the grounds that history will record the expenditure of *COCCOS* as responsible financial management in the interests of the community, now and for posterity. Even if expensive, the value in terms of enriching lives of future generations must surely far outweigh current financial considerations.

The interest of the public has now been stimulated. In 1981 a new organisation of private individuals, *the Braamfontein Spruit Trust,* was founded. Among a number of aims they hope to expand the work done on the Braamfontein Spruit, to raise money, and to increase public awareness and involvement in all "Spruit" issues.

Thus will urban conservation in South Africa grow as the public becomes involved in its progress.



WENDY BODMAN

TROPHY HUNTING IN THE TRANSVAAL

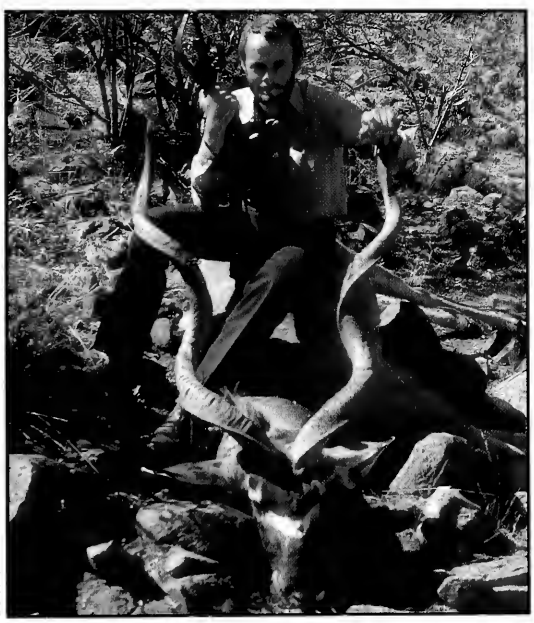
W K Kettlitz

The rapidly increasing demand for the services of professional hunters and hunting outfitters has led to a remarkable growth in the profession during the last few years. A number of problems unfortunately also emerged, which are now being eliminated by legislation and proper control.

During the past 5 years or more it has become increasingly difficult if not impossible for foreigners to hunt safely in many African states. This has led to an increased demand for trophy hunting opportunities in South Africa and South West Africa, in the process of which the conservation authorities have been caught somewhat off guard.

As it seems to be highly profitable many inexperienced, in some cases experienced but irresponsible, and in a few cases unscrupulous operators have in recent years entered the trophy hunting profession. During 1979 the industry elicited regular newsaper reports, sometimes at nearly weekly intervals, of poor and irresponsible treatment of foreign hunters. Eventually the situation deteriorated to such an extent that the authorities were forced to launch an investigation into the matter. This investigation indicated that the trophy hunting industry had to be put in order and controlled by legislation.

In terms of the constitution each province is responsible for the promulgation of legislation with regard to the conservation of its fauna and flora. The Provinces are thus also empowered to pass legislaion on the hunting of wild animals, provided this falls within the broad framework of conservation. The control of persons offering trophy hunting opportunities does not fall within this framework, with the result that the provinces originally did not have the authority to pass legislation with respect to the problem. On a request from the provinces, this authority was transferred to them by the central government in terms of Act 34 of 1980, which enabled the provinces to prepare legislation to control trophy hunting. In 1980, Ordinance No 6 was proclaimed in the Transvaal Provincial Council and the regulations in respect of this Ordinance were announced in 1981.



LUCAS POTGIETER

The Ordinance requires that a person be in possession of a permit before he may operate as a hunting outfitter or professional hunter. This only applies to a professional hunter who accompanies a foreign hunter on a hunt for financial gain, or to a hunting outfitter who organises hunting opportunities for foreign hunters for financial gain.

Before the Administrator issues a permit to an aspiring professional hunter or hunting outfitter, he has to satisfy himself that the applicant is suitable on grounds of his knowledge, skills and experience, to operate as such. These qualifications are evaluated by a testing team which the Administrator appoints especially for this purpose. This team also establishes if the facilities and service offered by the applicant meet the required standards.

To understand how the profession operates, it is necessary to briefly elaborate on the duties of the professional hunter and the hunting outfitter.

A professional hunter is a person who accompanies the client on a hunting trip. He is responsible for the well-being of the client in camp. He is in charge of the hunting staff, including the trackers, skinners, cook, servants and others. He has to see to it that his client is in possession of all the necessary permits, licences and letters of permission before going out on the hunt. He has to ensure that his client hunts a trophy class wild animal, and he must be able to evaluate any wild animal in the field against the standard in Rowland Ward's Records of Big Game, and to advise his client accordingly before it is shot. He must ensure that his client's trophy is correctly skinned and processed. He is responsible for his client's safety in the field and in camp. He must maintain communication between the camp and the outside world. He must strive towards letting each client hunt the best class trophy available, and must never save certain animals for clients who give higher tips. He must ensure that any wounded animal is tracked down and killed and that all killing is done as quickly and humanely as possible. He even has to see to it that his client's clothes are always freshly laundered.

The professional hunter does not receive payment directly from the client. The client pays the hunting outfitter, who in turn pays the professional hunter. The professional hunter does not recruit clients. In other words, he is employed by the hunting outfitter.

The hunting outfitter recruits clients by advertising or other means. The regulations require that a written agreement has to be entered into between the hunting outfitter and client before the hunt starts and that both parties act according to this agreement. The hunting outfitter organises the hunting trip, from the beginning to the end, according to this agreement. He arranges the hunting area and supplies the camping facilities, appoints the professional hunter and all the camp staff and is responsible for their remuneration. He supplies his client's transport. He obtains all the hunting licences, permits and letters of permission, as well as the transport permits and export permits for the client's trophies. He ensures that his client's trophies are stored and dispatched in accordance with modern taxidermic principles and are delivered to the address stipulated in the agreement in good condition.

The professional hunter has to keep a register in which all the details of each hunt, including the species hunted, when and where it was hunted, whether it was wounded or not, and other information is entered. He also enters when the hunt commenced and when it ended. The hunting outfitter, as his employer, and the client gets copies at the end of the hunting trip.

The hunting outfitter is remunerated by the client for all facilities, services rendered and trophies hunted and wounded, and in turn he remunerates all his employees. He accepts overall responsibility for the client and for obtaining and processing the trophy.

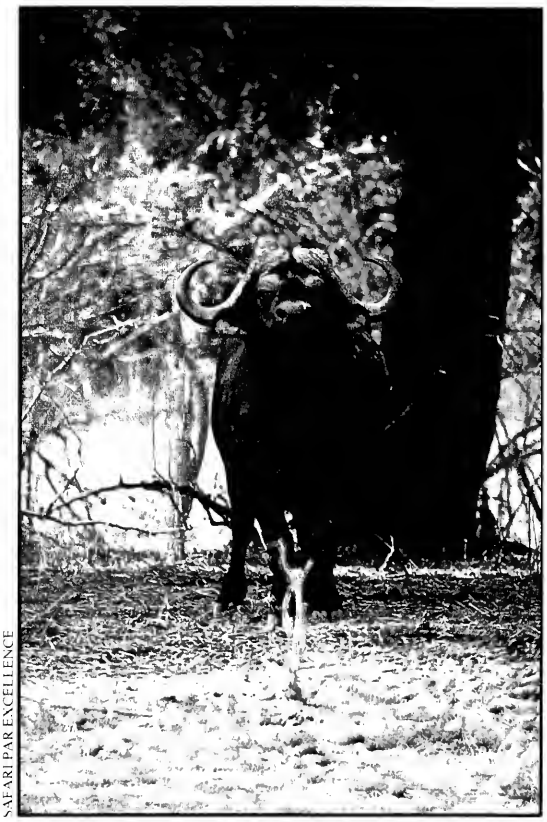
Although the professional hunter is in charge in the field and is responsible for the hunting, skinning and handling of the trophy, this does not reduce the hunting outfitter's responsibility for these functions towards his client. He has to be well informed on all aspects of the trophy hunting profession to be able to judge if the required standard is being maintained.

In most cases the hunting outfitter and professional hunter is one and the same person who is then responsible for the combined duties and functions of both.

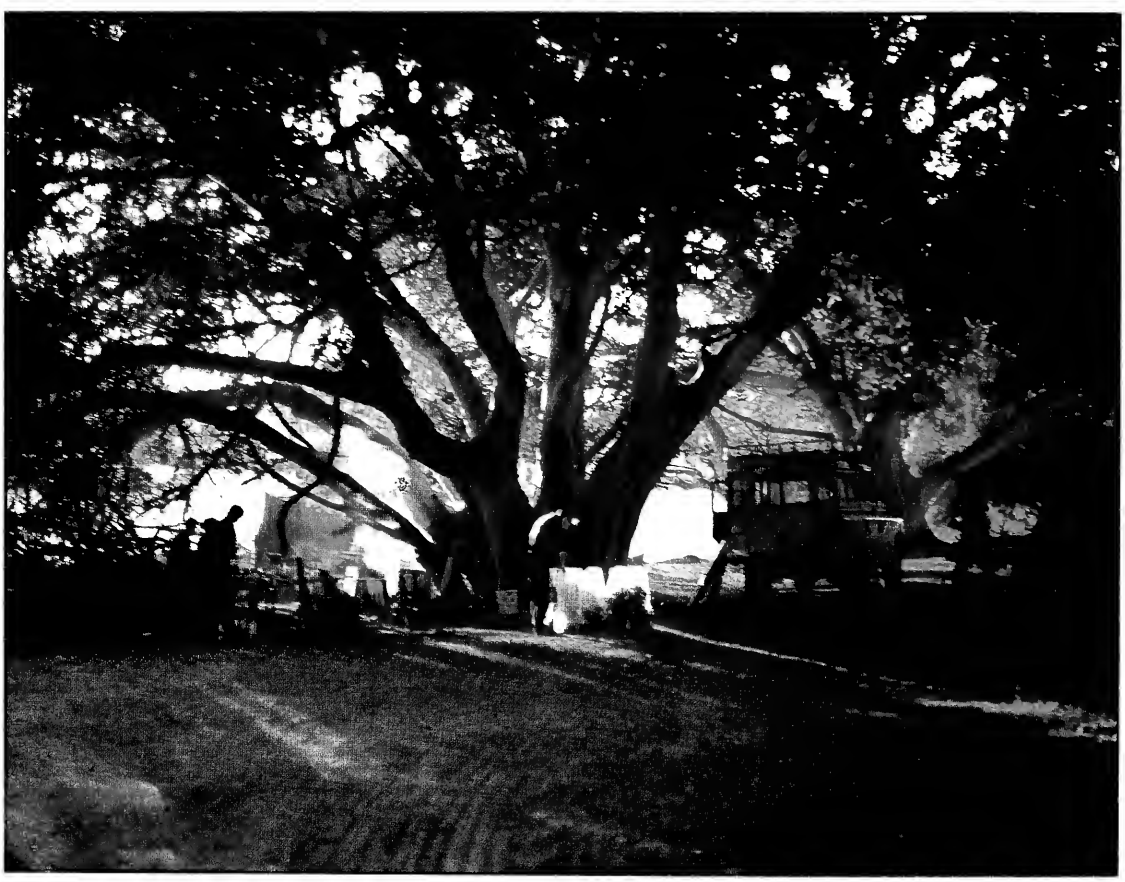
The regulations additionally provide that the Administrator may exempt certain professional hunters and hunting outfitters from the permit requirement. The exemption only applies to South African citizens who on their own land provide hunting opportunites for other citizens. If the client is a non-citizen and the hunt is provided for financial gain, the terms of the Ordinance automatically apply.

The test which an applicant has to pass before he can qualify for a permit is of a high standard. It consists of a written section, followed by a practical section conducted in the field. During this practical section the client's skill as hunter, his skill as a shot, his knowledge of the veld and his knowledge of plants and animals is thoroughly tested. He is expected to demonstrate how he will evaluate his client's trophy before it is shot, and how he will skin, process and handle the trophy according to recognised taxidermic methods.

As a client may spend thousands of rand on his hunting trip it is obvious that his trophy can become a very valuable memento. If a person claiming in his advertisement to



SAFARI PAR EXCELLENCE



LUCAS POTGIETER

know all about the trophy hunting industry allows his client's trophy to become damaged or lost it can cause many problems. For this reason the client's dispatch address is also mentioned in the agreement between the two parties. The fact that the hunting outfitter knows exactly

SAFARI PAR EXCELLENCE

how the trophy has to be processed also assures the client, who then knows that he is dealing with somebody equal to the task.

If a person with a permit as a hunting outfitter does not keep to his part of the agreement, legal steps can be taken against him. If it can be proven that he acted unethically and in so doing damaged the profession and the image of South Africa overseas, his permit may be withdrawn.

The regulations further stipulate that a person advertising trophy hunting opportunities has to meet certain requirements. He has to be the owner of the land on which the hunt is to take place, or he must obtain prior written permission from the landowner to allow his clients to hunt there. The wild animals which are offered must occur permanently and naturally on the land. In other words he must not be able to offer the excuse that the animals had occurred there, but had now moved away. He may not offer wild animals confined in small camps from which they cannot escape for hunting purposes.

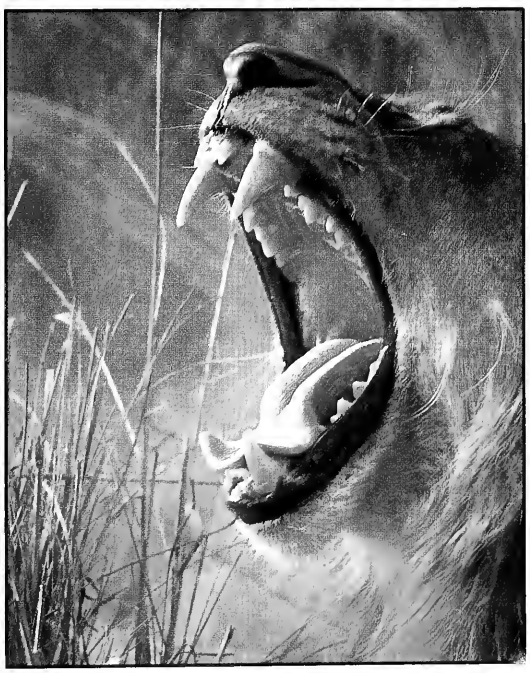
Before this legislation came into force the situation existed that any person could advertise his services as professional hunter or hunting outfitter. After recruiting a client, he would start searching for a place to hunt. In many cases this was unsuccessful and the client had to return home empty handed after incurring considerable expense.

According to statistics the average cost of a hunt in the Transvaal by a foreign hunter is approximately R9 000. This can easily increase to R20 000 if he is interested in hunting the so called "big four" namely buffalo, lion, rhino and elephant. In 1979 the average tariff for accommodation in a hunting camp was R250 per day. By 1981 this had already risen by approximately 50%. A hunting trip has an average minimum duration of 10 days, which means that the daily tariff has to be paid for 10 days whether or not the client shoots his quota well before the allotted time. In addition the tariff for each animal hunted is added to his account and this may vary from R80 for a warthog to as much as R6 000 for an elephant or rhino. The client has to pay for his own airfare and hotel accommodation and in most cases an additional handling fee for each trophy.

At first glance these tariffs seem to be exceptionally high. Unfortunately the lure of extreme profits has attracted a number of unscrupulous and inexperienced operators to the profession. If the hunting outfitter is able to supply all the facilities stipulated by legislation the profits are not so exorbitant. Exorbitant profits can of course be made if the client is fed on porridge, sausage and coffee and is expected to sleep under a tree. In fact cases such as this did occur in the past and for this reason a minimum standard of services and facilities is now stipulated.

Any reputable hunting outfitter's facilities should exceed the minimum standard by far. If a daily tariff of less than R150 for accommodation in a five star hotel is taken as basis, an idea can be formed of the service and facilities offered at R400 a day in a hunting camp.

It is clear that the exploiters and opportunists who in the past were responsible for South Africa receiving a bad reputation in the international trophy hunting circles can only be eliminated through strict selection and control through legislation. The hunting outfitter offering excellent facilities and services will always be in demand. The days of the porridge and sausage outfitters are numbered. Legislation protects overseas clients against inexperienced and opportunistic exploiters and promotes the industry, so that it can again become a clean profession with experienced operators of the highest integrity.



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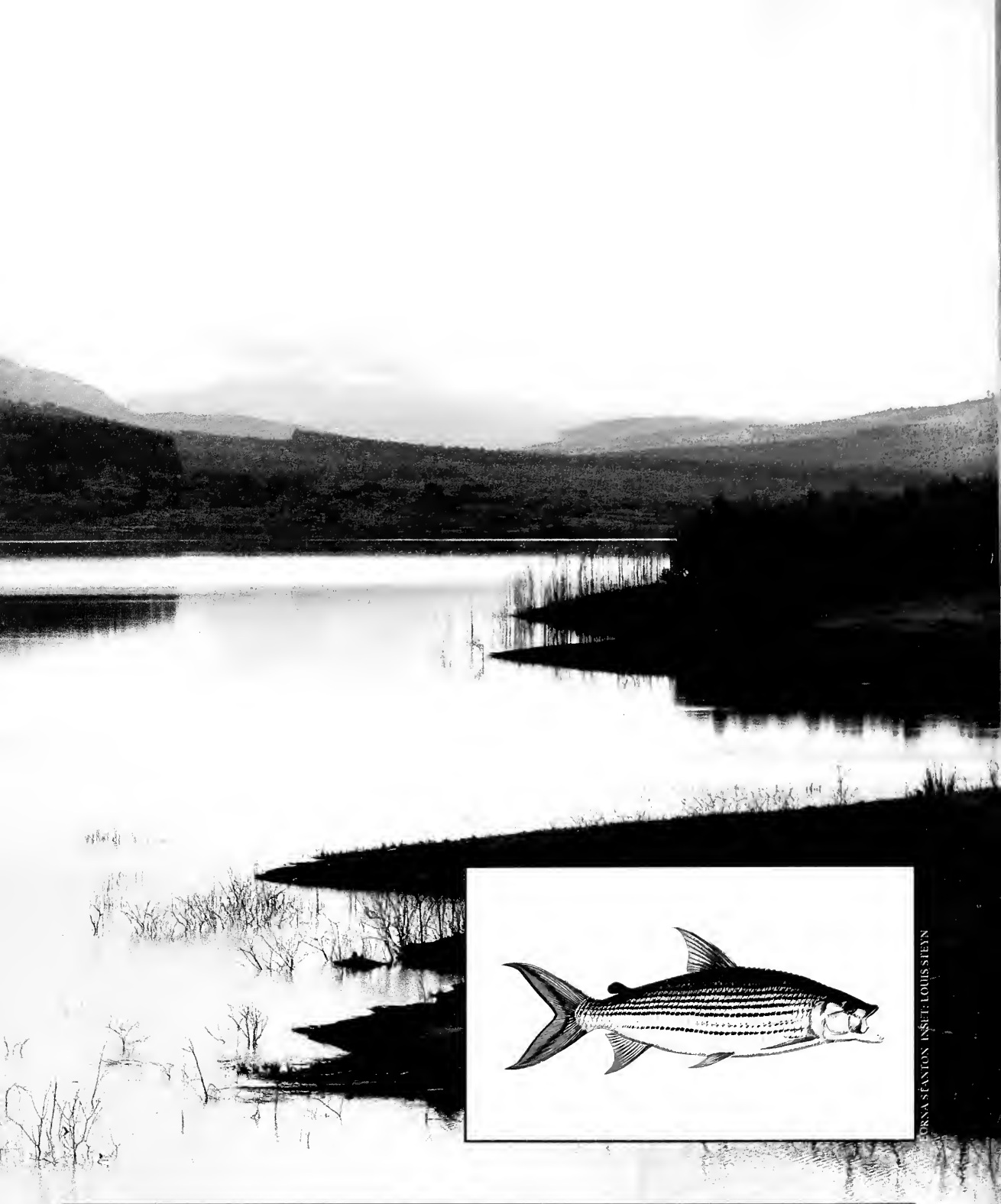


TORNA SEANTON INSET: LOUIS STEYN

Conservation of Tigerfish and Fish Farming Techniques

Nico van Loggerenberg

The tiger fish *Hydrocynus vittatus* is widely acclaimed by experts as being one of the most sought after angling fish species on the African continent. It can be distinguished from other species by its peculiar striped body colour pattern and large sharp teeth. The popularity of the tiger fish as angling fish can be ascribed to its fighting spirit and the voracious manner in which it takes the lure. The scientific name means "striped water dog" and this is, according to R A Jubb, a particularly fitting name for this exceptional predatory fish. It can reach a mass of 11,8 kg in South African rivers but attains a far larger size further north.

The tiger fish is due to stage a come-back as an angling fish in Transvaal waters, thanks to the imaginative application of sophisticated production techniques.

The southern limit of the distribution range in Africa is the Pongola River, while it is found as far north as the Nile River in Egypt and in West Africa. In Transvaal rivers it has a limited distribution which can be ascribed to the interaction of a number of factors. It is a warm water fish which migrates downstream to lower-lying reaches of the river during the winter where the water temperature is higher and more stable. As a result of the increasing numbers of dams and weirs in our rivers the fish migrating upstream during the summer months are effectively prevented by these man-made obstructions from reaching their original summer distribution areas. In winter large scale fish mortality above weirs and dam walls in the Komati and Pongola Rivers has been observed due to the inflow of cold winter water. On account of the low level of the river the fish could not negotiate the weirs to move downstream and avoid the cold water and as a result died of cold. As a result of this tiger fish are nowadays found only in the low-lying river areas which are mainly out of reach of the average angler. Most of the Transvaal rivers in which tiger fish still occur either lie in the Kruger National Park or the private nature reserves in the Lowveld and these rivers flow further eastwards over the border to Mozambique.

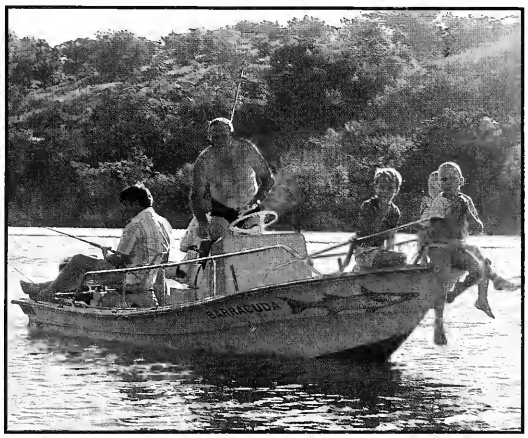
The building of large new irrigation dams can however be to the benefit of warm water fish species. The large volume of water in such a dam contributes to a more temperature-stable environment. It can thus be expected that these dams offer greater survival possibilities for warm water fish during the winter periods when compared to the original river where only river pools would have occurred. The original tiger fish population has in the meanwhile disappeared and repopulation from lower-lying river parts is effectively prevented by weirs and dam walls.

The Transvaal Nature Conservation Division has for many years envisaged rectifying the situation by stocking tiger fish in suitable large irrigation dams. Thus far the efforts have been hampered by a shortage of sufficient numbers of young tiger fish from natural sources for restocking purposes. In Transvaal rivers no natural tiger fish breeding areas occur and this means that the fish have to be obtained from other sources and transported over long distances.

Artificial breeding techniques have been used for many years by commercial fish farmers for the production of a variety of species such as trout, Chinese carp, grass carp and silver carp. A few years ago the technique was also successfully applied to produce fingerlings of the indigenous largemouth yellowfish *Barbus kimberleyensis* of the Orange River System for restocking the Vaal River.

A pilot project to examine the possibility of breeding tiger fish artificially was recently launched. In this way the supply of small fish which can be used for large-scale restocking can possibly be produced. Breeding stock was obtained in the Kruger National Park with the permission and help of the National Parks Board and transported to Phalaborwa. The local copper mine, Phalaborwa Mining Company, was kind enough to make nursery ponds and other facilities available which made this pilot project a possibility. During the same period fish were collected at Komatipoort and placed in dams of a number of farmers who were interested and willing to help. At this stage the Nature Conservation Division does not have its own facilities in a warm area where tiger fish can be kept during the winter period.

The breeding stock in these dams will be regularly examined during the breeding season to ascertain the degree of sexual development of the fish. In the past problems were experienced with females, which would not become spontaneously sexually mature in captivity to such a degree that they could be stripped and the eggs artificially fertilised and hatched. It is here where previous experience and proven methods in fish breeding are applied. Hormone



LORNA STANTON

injections to stimulate the onset of the sexually mature stage where the females can be stripped by hand have been used with success in the breeding of other fish species.

Tiger fish females have an exceptionally high potential egg production and this gives added impetus to the efforts to breed this fish artificially. According to researchers in South Africa and Zimbabwe the egg production of a female varies between approximately 8 000 to more than 1 million eggs. The egg production increases with age. If it were possible to fertilise the eggs of at least one female artificially, sufficient numbers of small tigerfish can be produced to stock a large irrigation dam such as the Fanie Botha Dam at Tzaneen. If these fish were to breed spontaneously on reaching maturity, the population would be self-maintaining which would improve the angling possibilities of this section of the river dramatically. This would also mean that one of our indigenous fish species would again be able to take its rightful place among the angling fish of the Transvaal.

The Euphorbias Re-evaluated

S P Fourie

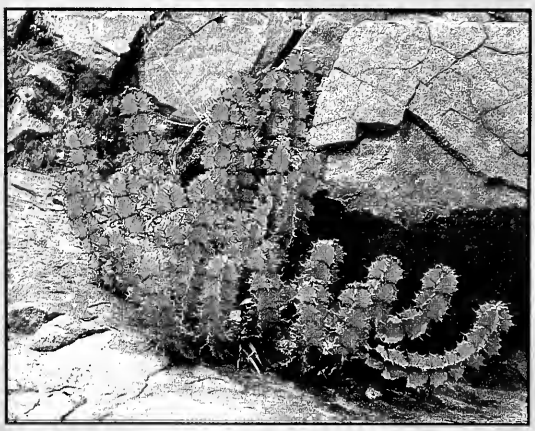
A variety of species occurs in the Transvaal, of which a number are rare or endangered. In most cases the casual factors can be traced back directly to human activity.

The Euphorbiaceae is a large family of flowering plants which includes herbs, shrubs and trees of a wide variety of shapes and sizes. The family is divided into more than 300 genera and 6 000 species, with representatives in all parts of the world. South Africa has its fair share, which includes more than 400 species of 39 genera, the largest of which is the genus *Euphorbia* with more than 200 representatives distributed in all the provinces.

It is the genus *Euphorbia* in particular, with its curious and varied growth forms and especially those species which have developed a more or less succulent habit, that has captivated collectors throughout the ages. Indications are that the interest in our succulent euphorbias is on the increase, as is evident from the large numbers of plants which have been exported to Japan, Europe and the Americas recently. It is for this reason that we must take a closer look at the conservation status of the succulent euphorbias.

Since it is impossible to discuss all the succulent euphorbias of South Africa in this short article, attention will be confined to those species which are endemic to the Transvaal and are listed in the Red Data Book on plants.

Sixteen species of *Euphorbia* are listed as being either endangered, vulnerable, rare or of doubtful status. A further five may be considered as candidates for any of the above categories if causal factors continue operating. All are endemic to Southern Africa, with 11 being endemic to the Transvaal.



EDUAN FOURIE

Euphorbia barnardii

Euphorbia barnardii is a small plant found only on two farms east of the Leolo Mountains in Sekhukhuneland. This handsome little shrub is extremely rare. Although the two populations number a few thousand plants, their habitat is severely degraded by mining activity, overgrazing and trampling. Collector pressure coupled with local vandalism are additional factors contributing to the endangered status of the species.

A dwarf succulent *Euphorbia groenewaldii* is found further north, near Pietersburg. This plant can be considered to be even more endangered than *Euphorbia barnardii*. In the past it grew in the small sandstone and quartzite hills around Pietersburg. A few populations were also found in the valley of the Sand River north of Pietersburg. However, due to urban development around Pietersburg, agricultural activity in the Sand River Valley, increasing human population of the Lebowa National Area and resulting degradation of habitat, this plant is in immediate danger of extinction. The very high collector pressure with which this euphorbia is faced gives it a high priority rating for immediate protection under legislation.

S P FOURIE

Euphorbia groenewaldii

Another dwarf euphorbia is faced with the same problem. The beautiful spirally twisted branches of *Euphorbia tortirama* lend it a certain degree of enchantment, making it a valuable collector's item. This is evident from the fact that more than 10 000 specimens have been collected and exported by one dealer in the last few years. *Euphorbia tortirama* enjoys quite a widespread distribution in the North-Western Transvaal. Unfortunately populations are scattered and low in number. The localities of the largest populations are known to collectors and are being severely denuded of individual plants. Agricultural activity in these areas has also played an important role in the present status of the species.

Euphorbia perangusta is an extremely rare euphorbia from the Marico district. Only two populations of these plants,

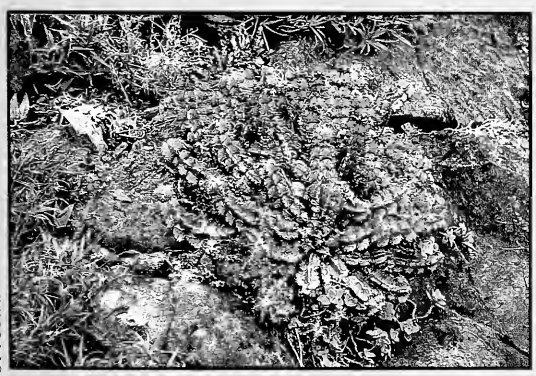
numbering not more than 150 individuals, were originally known to exist. However, during 1979 an intensive survey revealed one more locality numbering a few hundred specimens. Indications are that this plant also occurs in Botswana. Nevertheless, it remains very rare and populations are small and isolated. Collector pressure, overgrazing, trampling and disease are all factors influencing the status of this species, but a far more serious hazard is the activity of porcupines. These mammals dig up the tuberous fleshy roots as a source of food with the result that the damaged plants eventually rot and disintegrate. The rate at which this is happening is quite staggering and could be the reason for this species eventually becoming extinct.

EDUAN FOURIE

Euphorbia tortirama

A close relative to *Euphorbia perangusta,* not only in appearance but also in habitat preference, is the shrub *Euphorbia knobelii.* It is a very attractive plant with a striking colouring of alternate dark and light green markings on the branches. This could be the reason why it is also sought after by collectors. The species is restricted in distribution to a range of sandstone hills in the Marico district. On account of the limited numbers found at each of the localities, coupled with the various factors influencing the future of this plant, it should be considered a vulnerable species and not endangered as was previously believed. However, the status needs close monitoring.

A small euphorbia, *Euphorbia restricta,* grows in the picturesque vicinity of The Downs in the Transvaal Drakensberg. This little succulent is known to occur only in this area and shares its habitat with *Aloe dolomitica* and *Euphorbia schinzii.* Since no populations of this species have ever been found elsewhere and the numbers of plants at all the known localities are being drastically reduced by collectors, disease, trampling, fire and climatic conditions, it must be considered extremely vulnerable.

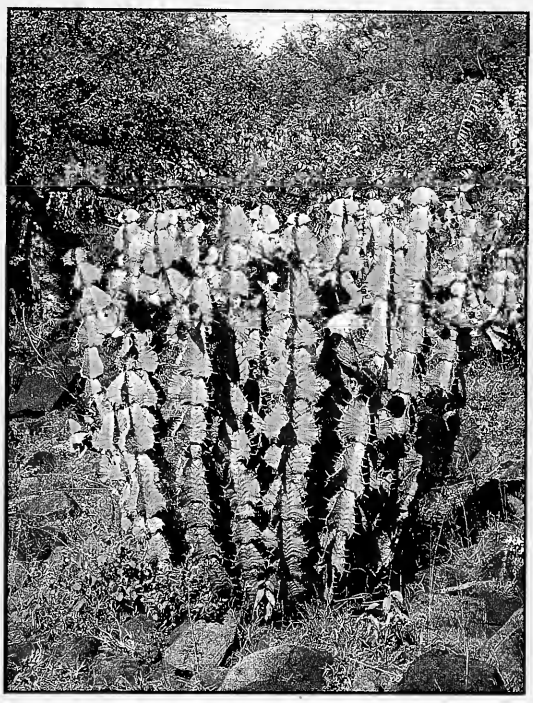


S P FOURIE

Euphorbia restricta

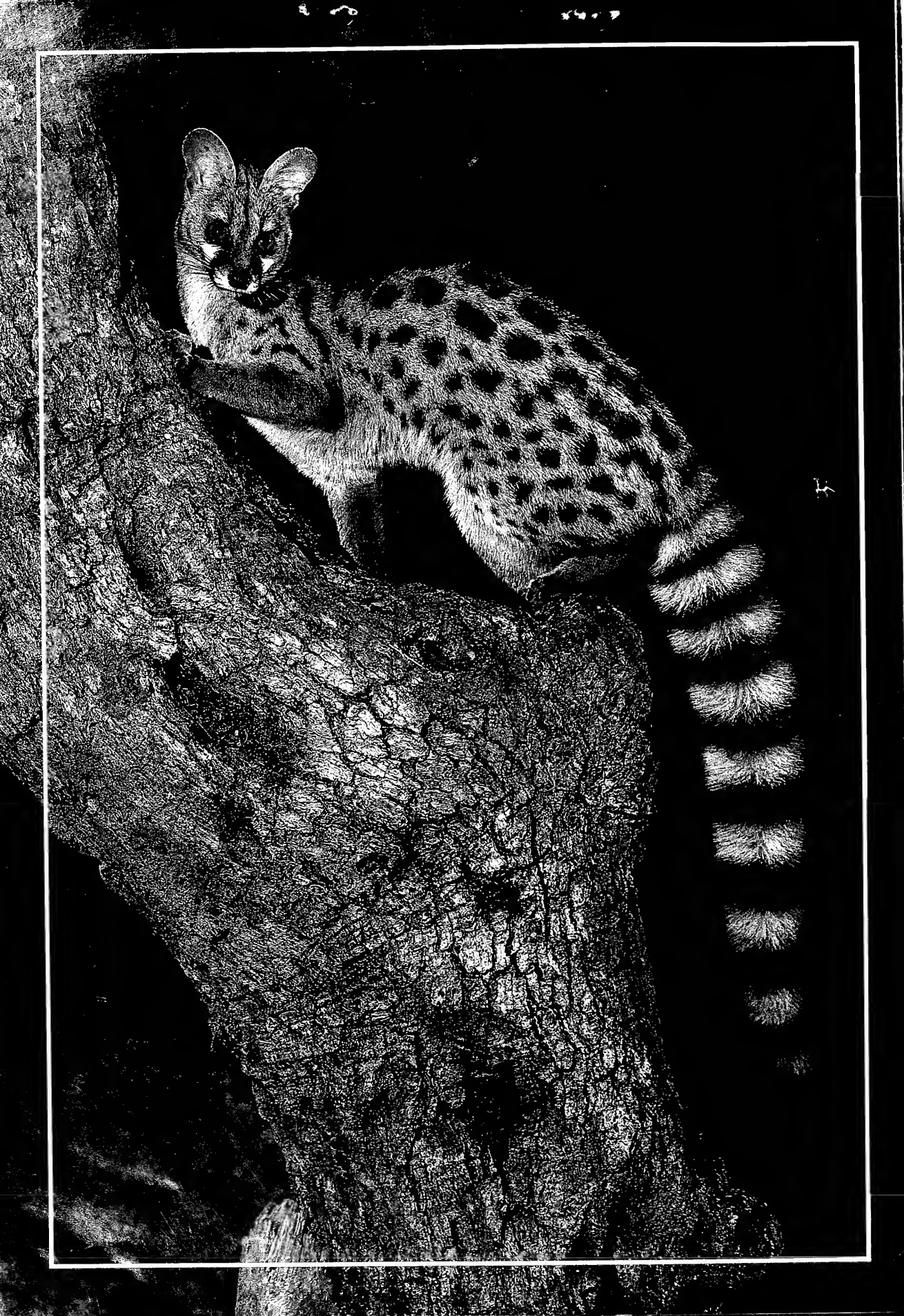
There are a number of other euphorbias which are not endangered or vulnerable at present but which are at risk, due to their small numbers and restricted habitat. These are usually localised within restricted geographical areas, or are thinly scattered over a more extensive range.

The rare *Euphorbia zoutpansbergensis,* which assumes tree dimensions and is a rather handsome species, is found in the Soutpansberg range in the Northern Transvaal. Another of our rare tree euphorbias, *Euphorbia sekukuniensis,* is found in the Leolo Mountains in Sekhukhuneland. It enjoys quite an extended distribution range since it occurs all along the Leolo Range up to near Chuniespoort and further eastwards towards Penge in the Olifants River Valley. The Olifants River Valley also harbours *Euphorbia grandialata,* a very attractive euphorbia resembling *Euphorbia cooperi,* except for the remarkable yellow and green markings on the branches, and the fact that *Euphorbia grandialata* carries its main stem underground, unlike *Euphorbia cooperi. Euphorbia*



S P FOURIE

Euphorbia grandialata

waterbergensis occurs in the Waterberg range and as it is considered to be rare, its status should be closely monitored. Indications are that numbers are slowly decreasing – the causes of which have yet to be established. It is possible that it may in future become a vulnerable species. *Euphorbia rowlandii* is restricted to the sandstone and quartzite ridges of the Levuvhu River Gorge. Since the largest populations of this plant are found inside the Kruger National Park, its conservation is assured.

It is obvious that the euphorbias, especially those mentioned in this article, are in dire need of protection. The Transvaal Nature Conservation Division is fully aware of the situation and certain steps have recently been taken to conserve the more endangered and vulnerable species. We can only hope that other conservation bodies will follow suit so that these beautiful plants will still be there for future generations to enjoy.